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THE

DENTAL COSMOS:

A

MONTHLY RECORD OF DENTAL SCIENCE.

Devoted to the Interests of the Profession.

EDITED BY

EDWARD C. KIRK, D.D.S., Sc.D.

Observe — Compare — Reflect — Record.

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CONTENTS OF VOLUME LIV.

1912.

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ORIGINAL COMMUNICATIONS.

Accelerating and Inhibiting Agents in the Oral Secretions 567
Amalgams Containing Tin, Silver, and Mercury 641
Amalgams: Their Manufacture, Manipulation, and Physical Properties. Cements: Their Manipulation and Physical Properties 174
Answer to Dr. Dewey's Discussion 1008
Atrophic Alveolitis 1095
Autogenous Vaccine Treatment of a Case of Advanced Pyorrhea Alveolaris 774
Beginnings of Diseases of the Peridental Membrane, and Their Prevention 684
Breaking-up (The) of a Cyst Wall 1007
Bridge (A) with Plumper for Restoring Facial Expression 764
Buccal Flanges as an Aid in Retaining Dentures 875
Calcification 47
Care (The) of the Mouths and Teeth of Little Children 197
Case (A) of Dental and Facial Restoration by Porcelain Jacket Crowns 21
Cast Gold Inlays 203
Casting Failures and Remedies 890
Certain Sections of the Human Jaws Made by the Late Dr. W. D. Miller 677
Clinical Review of Certain Pathological Phases Concerning the Maxillary Bones 1301
Constitutional Results of Pyorrhea Alveolaris 1110
Contribution (A) to the Study of Immunity to Dental Caries 659
Criticism of a Paper by Dr. Lawrence W. Baker entitled "A Preliminary Study of the Influence of the Forces of Occlusion on the Development of the Bones of the Skull" 171
Dental Clinics in Manila 1245
Dental Iconoclasm 418
Dental Impaction and Preventive Treatment 1
Dentist's (The) Attitude Toward Professional Literature 193
Development of the Bones of the Face and the Jaws by Orthodontic Treatment 655
Devices and Volumetric Tests for Salivary Analyses 429
Double Resection of the Mandible 1114
Effects Upon the Teeth of the Administration of Iron, Acids, etc., and the Precautions Taken by Physicians to Avoid Injury to the Enamel 1002
Evolution of Orthodontia—Recent Developments 853
Excavation for Preservation: A Reply to Dr. W. R. Clack 401
Expansion of the Dental Arch and Opening of the Maxillary Suture in Relation to the Development of the Internal and External Face 509
Experimental Oral Euthenics: An Attempt Objectively to Measure the Relation Between Community Mouth Hygiene and the Intellectual Efficiency and Educational Progress of Elementary School Children 404, 545

Experimental Study of the Tooth-Staining Properties of Various Colored Dentifrices 289
Extent to Which the Casting Process May be Advantageously Applied to Crown and Bridge Work 575
Filling Root-canals with an Improved Paraffin Compound 1081
Fundamental Causes of Dental Deterioration, and the Supreme Aims of Dental Hygiene 1214
General Anesthetics—Can the Dental Surgeon Use Them to Advantage in Daily Practice? 1126
Group (I) of Deformities of the Nasal Respiratory Tract Coincident with Dental Irregularities. (II) A New Instrument for Comparative Measurements, Demonstrating Changes in the Nasal Fossæ when Readjusting the Maxillary Arch 261
Hemorrhage in Hemophilia 60
How Shall the Profession Meet Its New obligations Resulting from Its propaganda for Popular Education in Oral Hygiene and Preventive Dentistry? . 778
How to Prevent Fracture of Gum Sections 427
Immunity and Susceptibility of the Teeth to Caries 537
Imperfections in the Diagnosis and Treatment of Pathologic Conditions of the Teeth and Jaws 272
Instrumentation the Prime Factor in Treatment of Conditions Causing Disturbances of the Alveolo-dental Ligament: Systemic Treatment Most Essential in Advanced Cases 702
Is Operative Dentistry Degenerating? . 413
Is the Dental Profession Prepared to Abandon the "D.D.S"? 672
Manipulation of Gold Foil 1203
Mistakes, Common and Uncommon 53
Modern Dentistry in Germany 1225
Mouth Infections: Their Etiology and a Consideration of What Effect They May Have on the Vital Organs and Other Tissues 1237
Natural Field (The) of Dentistry 694
Necessity For and Training of a Prophylactic Assistant 284
New System of Screw Bridge Work ... 534
Nitrous Oxid and Oxygen as a General Anesthetic, and Its Use in Dentistry 895
On Supernumerary Teeth in Man and Other Mammals 1193
On the Importance of Oral Hygiene in Combating Tuberculosis 1332
Operative Dentistry Not Degenerating: An Answer to Dr. James Truman .. 775
Oral Development in the Progeny Influenced by the Buccal Tissues During Pregnancy 1119
Oral Sepsis 529
Oral Sepsis from the Physician's Standpoint 1221
Orthodontia in Its Relation to Pyorrhea and Oral Hygiene 1123
Plaques 316
Potassium Sulfocyanate *versus* Diacetic Acid 58
Preparations for the Toilet of the Mouth and Teeth 1328
Preservation of Good Health and Sound Teeth by Eating No Other Bread Than That Composed of Wheat Flour When the Enzemes of Wheat Have Performed Their Action 1107
Proposed Regimen in Alveolo-dental Arthritis 788
Prosthetic Dentistry of Today, and Its Possibilities 422
Pyorrhea and Prophylaxis 39
Pyorrhea, Its Cause and Treatment ... 987
Pyorrhea Retentions and Dentures 269
Question (The) of Extraction in Orthodontia 137, 276
Reply (A) to Dr. William Bebb 663
Report of the Committee on Practice, Dental Society of the State of New York 883
Review of a Paper Entitled "Wherein Clinical Evidence is At Variance with Extension for Prevention" 25
Secondary Calcifications of the Tooth-Pulp 157
Segmental Gold Plate (The) 434
Stock Vaccines in the Treatment of Pyorrhea Alveolaris 997
Shrinkage in Cast Gold Inlays 758
Some Opportunities in Prosthetic Dentistry afforded by the Casting Process 879
Something on Cavity Preparation for the Gold Inlay 1321
Some Thoughts on Dental Amalgam Alloys, and a Discovery 906
Some Uses of Radiography in Dentistry 867

Stereoscopic Dental Skiagraphs (Stereographs) 745
Surgery of the Pulp, and Its Relation to Periapical Infection 188
Therapeutic Action of Phenol-Sulfonic Acid 397
Treatment by the Orthodontist Supplementing That by the Rhinologist 1312
Treatment of Chronic Alveolar Abscess with Fistula Discharging upon the Face 669
Treponema Mucosum of Pyorrhea Alveolaris 1327
Ulcerative Gingivo-stomatitis Due to Vincent's Bacteria 650
Unsanitary Regulating Appliances 789
Wax Pattern (The): A Technique, Together with Appliances, etc., for Its Execution 973
Ways and Means of Advancing the Cause of Mouth Hygiene in Such a Way as to Benefit the Public and the Profession 767
What the Government is Doing to Prevent Diseases 1230
Why Hydrogen Dioxid Fails to Work .. 425

Papers in Society Proceedings.

Adolescence of the Dental Profession .. 220
Advantages of Early Treatment of Malocclusion 467
Crown and Bridge Work 1357
Curriculum of the College of Dental Surgery of the University of Michigan 1024
How Old the New in Dentistry! 87
President's Address (Dental Faculties Association of American Universities) 1017
President's Address (Dental Society of the State of New York) 912
President's Address (National Dental Association) 1251
President's Address (Pennsylvania State Dental Society) 1135
President's Address (Susquehanna Dental Association of Pennsylvania) 1041
Professional Progress 79
Report of the Committee on Dental Science and Literature (Pennsylvania State Dental Society) 1138
Report of the Committee on Scientific Research (National Dental Association) 1352

CORRESPONDENCE.

Dental Clinics of the Children's Aid Society 1338
Dental Surgeons in State Militia 62
From the National Dental Association Committee on Patent Legislation ... 706
Influence of KCNS on the Dental Plaque 318
On the Fitting of a Gold Crown or a Band 584
Oxyphosphate Cement as a Root-filling 1339
Pioneer Women Dentists 206
Proposed Regimen in "Alveolo-Dental Arthritis" 788
Prosthetic Use (A) of Alum 1247
"Reply" (A) Which is Not a Reply to My Discussion of Dr. Case's Paper .. 1337
Unsanitary Regulating Appliances 789

PROCEEDINGS OF SOCIETIES.

Connecticut State Dental Association . 930
Dental Educational Council of America 363
Dental Faculties Association of American Universities 1017
Dental Society of the State of New York 97, 224, 912, 1036
National Dental Association, clinics ('11) 441
  Section I .....('11) 63, 331 ('12), 1357
  Section II ....('11) 70
  Section III ....('11) 207, 319
  General Sessions ......('12) 1247, 1340

National Dental Association—Southern Branch 216
Northeastern Dental Association 466, 592
Pennsylvania State Dental Society 79, 355, 1135, 1268
Seventh and Eighth District Dental Societies of the State of New York 585, 707, 790
Susquehanna Dental Association of Pennsylvania 1041, 1161

EDITORIAL.

Administration (The) of Anesthetics by Unqualified Persons 821
Are We Ready? 939
Dental Nurse, The 715
Educational Danger, An 370
"Festina Lente!" 1280
New Dental Institute (The) at Berlin 1284
New Recruits (The) and the New Order 605
Preparatory Standards 476
Professionalism 1373
"Provincialism" 236
Training (The) of Dental Instructors 1050
Two Notable Benefactions 818
"Vindication" (The) 113
Washington Meeting (The) of the National Dental Association 1171

BIBLIOGRAPHICAL.

American Text-book of Operative Dentistry 117
Anatomy: A Manual for Students and Practitioners 374
Chemical and Technical Formulæ and Hints for Dental Practice 120
Dental Disease in Its Relation to General Medicine 482
Dental Laws Condensed 945
Developmental Pathology: A Study in Degenerative Evolution 608
General History of Dental Surgery from Primitive Times to the Modern Epoch 119
Handbook of Anatomy 373
Leucoplasia Buccale (Leukoplakia of the Mouth) 373
Local Anesthesia in Dentistry, with Special Reference to the Mucous and Conductive Methods 1174
Manual (A) of Dental Prosthetics 239
Manual of Mental Science 240
Metallurgy: A Text-book for Workers in the Metal Industries 943
Old Age Deferred. The Causes of Old Age, and Its Postponement by Hygienic and Therapeutic Measures 374
Oral Surgery: A Text-book of General Surgery and Medicine as Applied to Dentistry 823
Prevention (The) of Dental Caries and Oral Sepsis 479
Rubber Hand-Stamps and the Manipulation of India Rubber 945
Stomatology in General Practice 1175
Text-book of Dental Histology and Embryology, Including Laboratory Directions 718

REVIEW OF CURRENT DENTAL LITERATURE.

Acute Osteomyelitis of the Jaw 1289
"Aging" of Vulcanite Rubber, Its Causes and Preventive Treatment 826
Alcohol Injection of the Gasserian Ganglion 491
Anchorage of Gold Inlays with Diverging Removable Pivots 610
Anesthesia, with Especial Reference to Nitrous Oxid and Its Sequences 243
Annus Medicus (The): Dental Surgery. A *Résumé* of the English Dental Literature of 1911 485
Antiseptic Treatment of Carious Vital Teeth with Tincture of Iodin 614
Beech Creasote, and Its Application in Dental Therapeutics 1054
Black Discoloration of the Teeth Due to Potassium Permanganate 1055

Blood Pressure in Anesthesia 121
Bridges of Aluminum Alloy 378
By-Effect (A) of Ligatures 614
Canines and Incisors with Two Roots . 122
Care of the Mouth of the Sick 1056
Cases of the Presence of Teeth at Birth 121
Cast Metal Appliances 123
Chewing-gum as a Mouth Cleanser 122
"Comforter" Caries 379
Considerations on Heated Ether in General Anesthesia in Dentistry 485
Contribution to the Rotation of Ligated Teeth 614
Contribution to the Study of the Concrescence of Teeth 1379
Contribution to the Treatment of Perforated Teeth 489
Contributions to the Avoidance of Failures in the Modern Method of Anesthesia by Novocain Injection 375
Contributions to the Problem of Resection of the Root-apex 720
Corundum 613
Defects in Speech in Anomalies of the Teeth and Palate 124
"Dermoid Teeth," or Teeth Developed in Teratomata 1379
Devitalization and Root-canal Treatment 1181
Distribution of the Nerves of the Dental Pulp 1055
Effects of Mercury upon the Teeth and the Maxillæ 721
Eighty-one Consecutive Cases of Cleft Palate Treated by Operation 1058
Enlargement of Root-canals with Sodium Dioxid 126
Epidemic of Chancres of the Lip from Kissing 123
Etiology of Hypercementosis 244
Excessive Use of Tobacco as a Complicating Factor in Anesthesia 946
Experiments and Observations on Bread, with Special Reference to the Causation and Prevention of Dental Caries 609
Extraction and Mutilation of Teeth Among Natives of Central Africa ... 611
Factors in the Etiology of Oral Carcinoma 493
Five Types of Difficult Extraction, and How They May Be Overcome 1181
Fixation of Bridges with Gutta-percha 489
Gas-Oxygen Anesthesia: Observation in 2000 Cases 1180
Gutta-percha and Its Use in Combination with Validol Camphoratum 241
Habits 376
Histological and Embryological Studies on the Enamel Cuticle 829
Imperfections in the Diagnosis and Treatment of Pathological Conditions of the Teeth and Jaws 724
Improvement (An) of Angle's Appliances 609
Indications for Removal of the Faucial Tonsils 1183
Influence of Oral Sepsis on Digestive Disorders 610
Influence of Parathyroidectomy upon the Incisors of Rats 378
Influence of the Teeth upon the Development of the Skull 948
Interproximal Space and Interproximal Caries 611
Justification of Orthodontic Operations from the Standpoint of Hygiene 1057
Keep the Tooth-brush Clean 125
Leucoplakia Buccalis, with Report of Three Cases 827
Ligatures in Orthodontia 1179
Local Treatment with Salvarsan in Diseases of the Oral Cavity Due to Spirochetes 1288
Locket Crown (The) 242
Making Ring Matrices for Plastic Fillings 493
Modern Principles in the Treatment of Empyema of the Antrum of Highmore 1184
Nearing Dental Anesthesia 1376
New Indication for Resection of the Root-apex for the Removal of Foreign Bodies from Root-canals 1289
New Method of Fastening Crowns and Bridges 1053
New Method of Securely Fastening Porcelain Facings to the Gold Base or Cap of Crowns and Bridges Without Soldering 377
Norwegian Pulp and Dentin Anesthetic (The) 948
Notes on the Taking of Plaster Impressions 723
Observations on the Teeth and Jaws Found in an Ossuary of the Stone Age 1057
Office Anesthetic for Small Surgery—Nitrous Oxid and Air—Self-administered 492
Operation for the Closure of Cleft Palate by Gradual Pressure 1058

Perfected Porcelain Inlay; Glass Burnishers 246
Physical Injuries as Results of Hydrofluoric Acid 1287
Pivot Bridge Fastened to Cast Split Ferrules 244
Plastic Roentgenography 721
Porcelain, with Special Consideration of Jenkins' Inlay Porcelain 243
Practical Hints for Silicate Cement Fillings 724
Present Status of Pulp-capping. Contribution to the Conservative Therapy of the Diseased Dental Pulp 1286
Present Status of Root-canal Treatment in Relation to the Minute Anatomy of the Root-canals in Man, Especially at the Apical Foramen 722
Prevention of Dental Deformities 375
Pulp and Dentin Anesthetic (A) 948
Pyorrhea Alveolaris: Its Importance in Constitutional Disorders, and Its Treatment by Vaccine 487
Ranula and Its Treatment 826
Re-covering the Exposed Necks of Teeth by Autoplasty 377
Relationship of Dental and Nervous Diseases 1377
Replantation and Its Success 1380
Replantation and Transplantation 488
Restoration of the Lingual Cusp in Bicuspids 613
Root-canal Treatment 828
Rubber Dam, Ligatures and Clamps, and Infection 949
So-called "Mixed" Tumors of the Salivary Glands 1288
Some Notes on the Dates of Eruption in 4850 Children Under Twelve Years of Age 825
Some Untoward Facts Regarding Fletcherism 245
Stomatitis Nicotiana 1053
Support for a Removable Saddle Bridge with One Abutment, in Case of Lack of a Posterior Abutment 1184
Symmetroscope (The): An Apparatus for Measuring the Symmetry or Asymmetry of Dental Arches 490
Taking the Impression of a Root to be Crowned 1378
Taking the Bite for Bridge Work 829
Technique of Casting Gold Bridges 243
Technique and Results of Deep Injections of Alcohol for Trifacial Neuralgia 488
Theory and Practice of Dental Elevators 828
Theory of Acquired Immunity in the Treatment of Pyorrhea Alveolaris 723
Toothache Due to a Plug of Earwax 951
Treatment of Trifacial Neuralgia 1375
Tropacocain. A Pharmaco-dynamic Study 1289
Ulcerous Stomatitis in Children 950
Use of Re-breathing in the Administration of Anesthetics 242
Uses of Celluloid Plates in Dental Practice 379
Wanted: A Sense of Asepsis 1054
White Spots in the Dental Enamel 949

PERISCOPE.

Action of Hydrogen Dioxid on the Flavoring Agents of Mouth-washes 1062
Advantages of Dental Instruments of Tantulum 130
Aid in Taking an Impression for a Bridge 247
Alcohol Lamp *vs.* Bunsen Burner 953
Alexander's Wax Gold for Repairing Gold Work 1185
Allaying Pain in Acute Pulpitis 496
Alloy for Casting Crowns 1290
Alveolar Abscess, Plastic Operation for Naso-oral Fistula, and Operation for Mandibular Necrosis 130
Alum for Perspiring Hands 1060
Anchorage of Cast Gold Inlays 728
Arrangement for Sterilization of the Operator's Hands 1186
Arresting Hemorrhage after Extraction 1061
Art (The) of Omission 383
Artificial Teeth Not a Luxury 382
Auxiliary Matrix (An) 249
Bacteria of the Mouth, and the Value of Tooth-brushes and Tooth-pastes 128
Bacteriology of Tooth-brushes 129
Bile-stained Teeth 954
Bleaching Pink Rubber 1060
Building Up Porcelain Crowns or Inlays 127

Bumpy Engine Belts ... 1381
Canine (The) as Criterion Tooth in Orthodontia ... 495
Capping Vital Pulps ... 382
Carbolic Acid Burns ... 381
Carbolic Acid for Preventing Pain During the Cementing of Crowns and Bridges ... 127
Care of the Mouth ... 1063
Care of Women's Teeth During Pregnancy ... 830
Carving Cusps for Swaged Gold Shell Crowns ... 127
Case of a Three-rooted Lower First Molar ... 248
Cast Jointed Logan Crown ... 496
Causes and Prophylaxis of Pain Arising After Extractions under Local Anesthesia ... 496
Caution in the Use of Aluminum Plates 727
Caution in the Use of Lactic Acid in Treating Pyorrhea Alveolaris ... 381
Cellulose Wadding ... 381
Cementation of Clamp Bands in Orthodontia ... 830
Cementation of Inlays ... 1291
Choice of a Bridge or a Plate ... 830
Cleaning Broaches ... 247
Cleaning Burs ... 247
Cleaning Files ... 247
Cleaning Mirrors ... 494
Closing the Flask in Making a Vulcanite Denture ... 831
Closure of Cleft Palate by Pressure ... 1185
Cocain Habit Acquired After Dental Treatment ... 1185
Comparative Effects of General Anesthetics on Blood Changes ... 381
Considerations in the Preservation of Bicuspids ... 726
Construction of a Hood ... 1290
Decolorizing the Iodin Stain ... 1185
Dental Clinic (A) for School Children in Vienna ... 383
Dental Disease and the Mind ... 954
Diagnosis and Treatment of Chronic Alveolar Abscess ... 1382
Diagnosis of Diseases of the Pulp by the Electric Current ... 1186
Diagnostic Symptoms of Angina ... 728
Disinfecting the Office and Waiting-room by Formaldehyd ... 250
Drainage of Suppurated Antrum of Highmore ... 495
Elimination of Lockjaw ... 1383
Facilitating the Cutting of Aluminum 247
Faucial Tonsils and the Teeth ... 129
Finishing Amalgam Fillings ... 248, 1382
Finishing Gold Inlays and Fillings ... 952
Flasking a Vulcanite Denture ... 1186
Gaining Space for the Adjustment of Clamp Bands in Orthodontic Treatment ... 248
Gilding Without Galvanic Battery ... 495
Glass-Stoppered Bottles for Volatile Substances ... 615
Gold Inlay Bridge Cast in One Piece .. 726
Good Temporary Filling ... 248
Gum Camphor for Adapting Inlay Matrices ... 247
Heating Gutta-percha ... 381
Hints for Setting-up Teeth in Plate Work ... 953
Hints on Treatment of Fractures of the Jaws ... 953
Hollow Dowels for Crowns and Bridges 1187
How Athletes Lift Heavy Weights with Their Teeth ... 1061
How to Make Sticky-wax ... 1060
Imparting a Dull Finish to Aluminum . 247
Importance of Hard Plaster of Paris in Vulcanite Plate Work ... 127
Improved Method of Fitting Detached-post Crowns to a Root ... 249
Influence of Mastication on the Condition of the Teeth ... 952
Inlays as Bridge Attachments ... 1291
Inserting Temporary Gutta-percha Fillings ... 382
Instruments of Pure Nickel for Inserting Silicate Cement Fillings ... 381
Iron Solution Given in Capsules to Protect Teeth ... 380
Irrigation Through the Inferior Meatus in Preference to the Alveolus in Chronic Purulent Maxillary Sinusitis 1062
Japanese Treatment of Syncope ... 1061
Keeping Spittoons Clean ... 1060
Keeping Vulcanizing Flasks Clean ... 1060
Local Treatment with Salvarsan in Spirochetic Diseases of the Oral Cavity ... 726
Lubricating Oil for Dental Engines ... 494
Making a Clear Shellac Solution ... 495
Making Gold Foil Adhere to an Old Filling in Repairing ... 952
Making Iron Rust-proof ... 1185
Making Perfectly Fitting Clasps ... 128

Making Useful Scalers 382
Manipulating the Sprue in Wax Model for Cast Inlay 381
Method of Adding Solder in a Soldered Bridge 381
Method of Disinfecting a Tooth with Dead Pulp 128
Method of Filling a Cavity at the Bifurcation of a Root 1185
Method of Repairing a Gold Shell Crown 248
Mouth-wash after Extractions 1061
Movable Free Dental Dispensary (A) .. 953
Moving Canines, Bicuspids, and Molars on One Side, Buccally, in Orthodontia 616
Necrosis of Jaw After Measles 1291
Nitrous Oxid and Oxygen Anesthesia .. 1063
Number of Dentists in Great Britain .. 1381
Obtaining a Perfect Joint Between Facing and Backing in a Richmond Crown 494
Obtaining Smooth Palatal Surface in Vulcanite Dentures 952
Operator's Hands (The) 1062
Oral Hygiene in the Somali Tribe 129
Oral Hygiene During Typhoid Fever .. 383
Oxydase in Saliva 128
Packing Vulcanite Dentures 1381
Painless Excavation of a Hypersensitive Tooth Affected with Pericementitis by the Application of Cement 1187
Paraffin Injection for Disfigurement Following Dental Abscess 494
Paraffin Treatment for Carborundum Wheels 955
Platinum Solder Formula 1382
Plea for the Porcelain Inlay 382
Points Regarding Ludwig's Angina 382
Polishing Amalgam Fillings 1060
Polishing Fillings with Sandpaper Disks 494
Post-Anesthesia Acidosis 494
Potassium Cyanid as a Flux in Soldering 247
Practical Method of Using Smooth Broaches in Root-canal Treatment .. 830
Preparing Approximal Cavities in Lower Incisors and Canines for Porcelain Inlays 249
Preparing Approximal Cavities in Upper Incisors and Canines for Porcelain Inlays 249
Preparing Large Approximal Cavities in Anterior Teeth 248
Present Condition of Treatment of Root-canals 1186
Preserving Hydrogen Dioxid 247
Preserving Hypodermic Needles Free from Rust 1060
Preserving the Sharpness of Burs in Sterilizing 128
Preventing Adhesion of Cement to Instruments 952
Producing Smooth Surfaces in Vulcanite Plates 1061
Prophylactic Treatment in the Application of Arsenic 1290
Proportions of Calcium and Magnesium in Bones and Teeth in Health and Disease 831
Protecting Soft Tissues in Polishing Fillings or Grinding Natural Teeth . 952
Protecting the Gingival Tissue in Grinding Down Roots of Anterior Teeth 494
Protecting the Hands When Working with Photographic Developers 1188
Protection of the Patient's Tongue During Dental Operations 1061
Public Recognition of the Necessity of Oral Hygiene 250
Public School Dental Clinics in Sweden 615
Quick Method of Remounting Teeth on Vulcanite or Weston's Metal Plates with Melotte's Metal 832
Quick Polish (A) 247
Reattaching One or More Teeth to a Vulcanite Denture 494
Refining Gold 954
Regulating Inlocking Upper Centrals or Laterals 129
Reinforcing Dowel Crowns and Tube Teeth 383
Relations Between Mouth-breathing and Pulmonary Tuberculosis 384
Relief of Facial Neuralgia 130
Relieving Pain After Extraction 247
Relieving Pain Due to Application of Formocresol 952
Removable Pin Teeth 1381
Removable Pivot Tooth 496
Removing Discoloration of Teeth Caused by Silver Nitrate 381
Removing Hardened Silicate or Other Cement from a Roughened Glass Slab 1185
Removing Inlay Patterns 1188
Removing Plaster from a Vulcanite Denture 1381

Removing Teeth from Old Vulcanite Plates 1061
Removing the Odor of Rectified Alcohol 1061
Removing the Odor of Tobacco and Alcohol from the Mouth 1060
Rendering Cork Stoppers Impermeable 248
Repair of a Gold Crown with a Broken Surface 615
Repairing a Broken Facing Without Removing a Bridge 380
Repairing Broken Cables 1185
Repairing a Broken Richmond Crown Pin 129
Repairing Gold Crowns 127
Repairing Vulcanite Dentures 495
Replacing a Tooth in a Vulcanite Denture 1291
Requirements for a Hood 1291
Restoration of Fractured Crown and Root 955
Restoring an Incisal Corner with Silicate Cement and Gold 250
Restoring Clogged Carborundum Wheels 952
Retarding the Setting of Plaster 247
Retention Plate of Rubber in Orthodontic Cases of Classes II and III ... 727
Roughening Posts or Tubes Before Cementing in Root-canals 495
Round Envelopes for Dental X-ray Films 1382
Salvarsan Reaction on Teeth 1186
Sarcoma Due to an Ill-fitting Denture 248
Sectional Impression for Difficult Cases 128
Securing Separation for the Adjustment of Clamp Bands in Orthodontia 615
Self-cleansing Factors in the Oral Cavity and Dental Caries 832
Separating Fluid 1381
Separating Plaster Models from a Compound Impression 494
Separating Plaster Models Without Separating Fluids 952
Sharpening Burs 128
Small Stones for Preparing Cavity Margins 494
Softening Rubber Before Packing a Plate 247
Soldering Dowels for Crowns 1062
Soldering Floors and Cusps to Banded Crowns 381
Solvent for Cocain in Pulp Anesthesia 726
Sources of Invasion in Tuberculosis of the Maxillæ 495
Split Roots 497
Stable Solution of Cocain 380
Sterilizing Wax 247
Suggestions for Safe Nitrous Oxid and Oxygen Anesthesia 1187
Suggestions Regarding Nitrous Oxid Anesthesia 1188
Sulfuric Acid a Silver Solvent 383
Supra-occlusion of Molars in Open-bite Malocclusion 497
Surgical Treatment of Cleft Palate 1290
Swaging a Cap for a Root 831
Sweating Teeth Off Soldered Plates 1062
Synthetic Rubber 1383
Syphilitic Infection Transmitted by Non-sterilized Cotton-holder 727
Temporary Retention for Loose Upper and Lower Incisors 615
Temporary Stopping, Especially for Hypersensitive Cavities 1061
Time of Exposure and Use of Intensifying Screen in Dental Radiography . 131
Tincture of Iodin as an Antidote in Phenol Poisoning 381
Treatment for Nausea 1063
Treatment of Chronic Alveolar Abscess 1290
Treatment of Leukoplakia 1187
Treatment of Mercurial Stomatitis with Salvarsan ("606") 615
Ulcerous Lesions of the Tongue 1186
Useful Temporary Stopping (A) 1060
Uses of the Radiograph in Dentistry .. 497
Using Old Burs as Vulcanite Trimmers 247
Vaccine Treatment of Pyorrhea Alveolaris 384
Variations in the Occurrence of Nitrite in the Saliva 382
Vulcanite Dentures 1185
Vulcanite Plate of Black Rubber with Pink Rubber Veneer, Made in One Vulcanization 496
Waste of Gold in Dental Laboratories . 953
Water (Not Oil) for Arkansas Stone .. 1381
Waxing Mechanical Saws 1290

HINTS, QUERIES, AND COMMENTS.

Accurately Adapted Porcelain Filling . 385
Amalgam Fillings 385
Bridge with Posterior Cast Gold Inlay Abutment 617
Case of Fracture of the Lower Jaw Diagnosed Only by Means of the X Ray 618
Casting Under Steam Pressure Developed in the Vulcanizer 251
Caution in the Use of All-porcelain Occlusal Surfaces in Bridge Work 955
Difficult Case (A) for Prosthetic Restoration 386
Finishing Wax Impressions in Inlay Work 730
Hint Regarding the Use of the Rubber Dam 730
Hollow Gold Shell Crown with Cast Base for Badly Decayed Posterior Teeth 616
How to Remove Gold Crowns, etc. 131
Impacted Deciduous Molar 1064
Instruments for Inserting Silicate Cement Fillings Without Risk of Subsequent Discoloration 386
Making a Post of Gold Wire 251
Method of Anatomical Articulation of Teeth After Vulcanization 1066
New Saddle Bridge 1065
Paraffin Treatment of Chalky Enamel .. 1384
Perfectly Fitting Porcelain Inlays (A) 498
Porcelain *vs.* Gold: The Electrotyped Matrix for Porcelain Work 729
Repair of Broken Dowels in Crowns ... 1292
Sanitary Matrix Bands of Transparent Celluloid 499
Springs in Difficult Prosthetic Cases .. 1292
Springs Suggested in "A Difficult Case for Prosthetic Restoration" 833
"Sprinting" as a Cure for Mouth-breathing 132
Unhygienic Bridge Work—Malpractice 730

DENTAL LEGISLATION.

Legislation Creating a Corps of Naval Dental Surgeons 1285

OBITUARY.

Bartlett, Charles H. 834
Bödecker, C. F. W. 1067
Boon, Geo. A. 132
Bowman, Sands J. 957
Clifton, R. H. 255
Corcoran, J. C. 389
Davis, Samuel E. 731
Freeman, Samuel A. 388
Friedrichs, Geo. J. 956
Gilbert, Wm. H. 619
Harris, Frank L. 255
Hoag, Wm. E. 957
Hougland, U. S. 834
Michaels, Joseph P. 622
Milliken, Geo. G. 252, 387
Perry, Safford G. 252, 499, 957
Root, Joseph P. 1294
Rose, Angus V. 627
Smith, Augustus B. 254
Stockton, Charles Stacy 1293
Stockwell, Chester T. 253
Volck, Adelbert J. 730
Whitney, Auville L. 834
Williamson, W. H. 732

Brief Necrology—133, 255, 389, 499, 627, 732
835, 958, 1384

DENTAL COLLEGE COMMENCEMENTS.

Atlanta Dental College 837
Baltimore College of Dental Surgery .. 840
Baltimore Medical College, Dental Department 959
Barnes Dental College 841
Cincinnati College of Dental Surgery . 837
College of Dental and Oral Surgery of New York 961
College of Physicians and Surgeons ... 959
Colorado College of Dental Surgery ... 959
Drake University, College of Dentistry 963
Howard University, Dental Department 960
Georgetown University, Dental Department 1071
George Washington University, Dental Department 1068
Kansas City Dental College 839
Laval University, Dental School 1071
Lincoln Dental College 838
Louisville College of Dentistry 841
Medico-Chirurgical College, Department of Dentistry 963
Meharry Dental College 836
New York College of Dentistry 960
North Pacific College, Dental Department 839
Northwestern University, Dental Department 1069
Ohio College of Dental Surgery 842
Philadelphia Dental College (Temple University) 964
Royal College of Dental Surgeons of Ontario 836
Southeastern Dental University 836
Southern Dental College 837
Starling-Ohio Medical College, Dental Department 840
State University of Iowa College of Dentistry 963
Texas State Dental College 838
Tufts College Dental School 1070
University College of Medicine, Dental Department 839
University of Buffalo, Department of Dentistry 841
University of California, Dental Department 838
University of Michigan, Dental Department 1069
University of Minnesota, College of Dentistry 1070
University of Pennsylvania, School of Dentistry 962
University of Pittsburgh, School of Dentistry 964
University of Southern California, Dental Department 961
University of Tennessee, College of Dentistry 838
Vanderbilt University, Department of Dentistry 842
Washington University, Dental School 964
Western Dental College 961
Western Reserve University, Dental School 962

DENTAL SOCIETY NOTES AND ANNOUNCEMENTS.

Academy of Stomatology 1297, 1386
Alabama Board of Examiners 638
Alabama Dental Association 635
American Dental Society of Europe ... 256
American Medical Association, Section on Stomatology 631
American Miller Memorial 848
American Society of Orthodontists ... 630
Arizona Board of Examiners 1299
Arizona Dental Society 135
Arkansas State Dental Association 636
Army Dental Surgeons 135, 259, 396, 508, 640, 744, 851, 971, 1080, 1191, 1300, 1388
Association Internationale de Perfectionnement Scientifique 391
Brooklyn Odontological Society 507
California Board of Examiners 1299
Canadian Dental Society and Ontario Dental Association 133
Chapin A. Harris Memorial Fund 135
Chicago Dental Society 1297
Chicago Dental Society and the Institute of Dental Pedagogics 134
Colorado Board of Examiners 1079, 1387
Colorado State Dental Association 636
Complimentary Dinner to Dr. W. W. Walker 133

Connecticut Dental Commissioners 637
Connecticut State Dental Association .. 392
Delta Sigma Delta Fraternity 965
Eastern Dental Society of the City of New York 258, 971, 1386
Examination of Dentists for the Army . 260
Fifth District (N. Y.) Dental Society . 394
Florida Board of Examiners 637
Free Dental Dispensary Opened at Wilkes-Barre 1076
Georgia State Dental Society 506
G. V. Black Dental Club 135
Idaho Board of Examiners 639
Illinois State Dental Society 258, 850
Illinois Board of Examiners 639, 1189
Indiana Board of Examiners 136, 638
Indiana State Dental Association 258
Institute of Dental Pedagogics 630, 1297
International Congress on Hygiene and Demography 734
Iowa Board of Examiners 639, 1299
Iowa State Dental Society 257
Kansas State Dental Association 135
Kentucky State Dental Association 394
Lake Erie (Pa.) Dental Association ... 393
Lebanon Valley (Pa.) Dental Association 632
Maine Board of Examiners 742
Maine Dental Society 635
Maryland Board of Examiners ...507, 1298
Maryland State Dental Association 737
Massachusetts Board of Registration 395, 742, 1078
Massachusetts Dental Society 503
Michigan Board of Examiners 507, 1299
Miller, W. D., Club of Pittsburgh 258
Minneapolis Dental Society 392, 1298
Minnesota State Dental Association ... 394
Mississippi Board of Examiners 743
Mississippi Dental Association 505
Montana Board of Examiners ... 743, 1078
Montana State Dental Society 971
National Association of Dental Examiners 965
National Association of Dental Faculties 843
National Dental Association 391, 1073
National Dental Protective Association 502, 844
National Dental Association—Southern Branch 965
Nebraska State Dental Society 632
New Hampshire Dental Society 394
New Hampshire Board of Registration 1299
New Jersey Board of Registration..395, 1299
New Jersey State Dental Society ..258, 849
New York Institute of Dental Technique 971
New York State Dental Society 257, 394
North Carolina Board of Examiners ... 508
North Carolina Dental Society 637
North Dakota Board of Examiners.743, 1386
North Dakota Dental Association 393
Northeastern Dental Association 1078
Northern Illinois Dental Society 1190
Northern Ohio Dental Association 740
Nova Scotia Dental Association 637
Odontological Society of Western Pennsylvania 392
Ohio State Dental Society 971, 1298
Oklahoma Oral Hygiene Society 632
Oklahoma State Dental Association ... 392
Pennsylvania Board of Examiners .638, 1300
Pennsylvania State Dental Society 394, 1190
Piedmont (S. C.) District Dental Society 135
Rhode Island Board of Registration.638, 1298
Prize Competition of Zentralverband der Oesterreichischen Stomatologen 848
Rutland (Vt.) County Dental Society 394
Seventh and Eighth District (N. Y.) Dental Societies 1297
South Carolina Board of Examiners .. 639
South Carolina State Dental Association 635
South Dakota Board of Examiners 136, 743
South Dakota State Dental Society 135
Southern California Dental Association 505
Southern Minnesota Dental Society ... 502
Southern Wisconsin Dental Association 635
Southern Nebraska Dental Society 392
Susquehanna Dental Association of Pennsylvania 504
Tennessee State Dental Association ... 506
Texas Board of Examiners 395
Texas State Dental Association 393
Transactions of Fifth International Dental Congress, publication of 133
Tri-Society (N. J.) Exhibition and Convention 505
Utah State Dental Society 635
Vermont Board of Examiners 640
Vermont State Dental Society 392, 850
Virginia Board of Examiners 639
Virginia State Dental Association 637
Washington University Dental School . 503
West Branch Dental Fraternity 741

West Virginia Board of Examiners ... 507
West Virginia State Dental Society ... 740
Wisconsin Board of Examiners ...507, 1299
Wisconsin State Dental Society 849
Wyoming Board of Examiners 743
Xi Psi Phi Fraternity 1072

Monthly Record of Patents Relating to Dentistry.

PATENTS 136, 260, 396, 508, 640, 744, 852, 972, 1080, 1192, 1300, 1388

INDEX.

INDEX TO VOLUME LIV 1389

THE

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ORIGINAL COMMUNICATIONS.

DENTAL IMPACTION AND PREVENTIVE TREATMENT.

By VARNEY E. BARNES, D.D.S., Cleveland, Ohio.

(Read before Section I of the National Dental Association, at its annual meeting, Cleveland, Ohio, July 25, 1911.)

IMPACTION is a forcible collision or contact of a moving body with another either moving or at rest. *Dental impaction* is the forcible contact of abnormally erupting teeth with resistive tissues or with other teeth.

ETIOLOGY OF IMPACTION.

Dental impaction is therefore a condition of abnormal dentition. It begins with the difficult teething of the infant, and in greater or lesser degree may persist through adolescence and maturity. The generally recognized and feared impaction of third molars is the terminal and one of the greater degrees of a sequence of impactions which began with the difficult deciduous dentition and are more easily recognized, in varying degrees, in the crowded eruptions of the permanent teeth.

Impaction implies an impetus and a reaction. The impetus is in the tooth erupting, usually into too small an arch, under the stress of the vertical eruptive force. The reaction consists in the irregularity or crowding of teeth and the resultant disarrangement of the associated nervous system. This disarrangement may be produced with a practically normal nervous organism, but more probably with the abnormal, upon which it is more likely to act and show the most marked effects.

DEFECTIVE DECIDUOUS DENTITION.

The difficult teething of the infant results from a defective development, which is generally associated with artificial feeding.

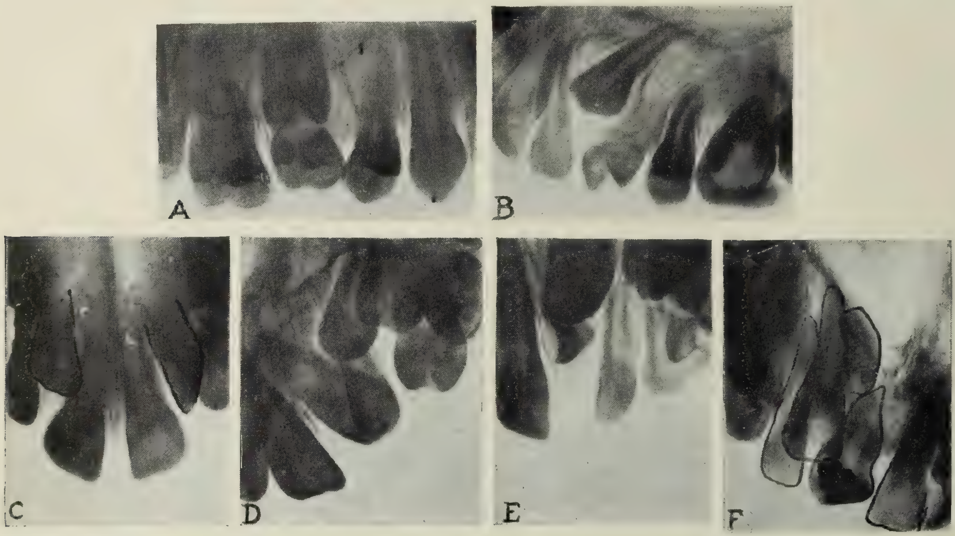
Artificial feeding not only implies imperfect feeding and assimilation, but also is indicative of the necessity for that artificial feeding, which means the failure of the natural food. The failure of the mother's milk to properly nourish the infant indicates that the prenatal conditions were not correct or normal, and that neither the food nor the child were normal or suited to one another, therefore prenatal and postnatal developments must be more or less deficient. Heredity, by producing tendencies toward inharmonious developments of bone and teeth, may produce difficult teething without any indications or history of improper feeding or of abnormal prenatal conditions.

The normal teething of infancy and youth should occur easily and painlessly, and be unaccompanied by any nervous, muscular, digestive, or other abnormal disturbances. Teething should most certainly be attended by some stress, but that stress should only be of an amount sufficient to produce a proper physiological development. An undue stress may change a physiological condition to a pathological one, depending upon the amount of stress, the direction of its deviation, and the character of the organisms upon which it may operate.

PERIODS OF IMPACTION.

The nervous, digestive, and temperature disturbances of the teething infant have long been known. The evils of third molar impactions are also well recognized. Between these two extreme stress eruptions there are at least from thirteen to fifteen years, which include the eruptive periods of the permanent teeth. Considering the fact of the prevalence of dental irregularity among all classes in modern civilization, it is most reasonable to conclude that between the impaction of infant teething and that of third molars there are other periods of impaction. These other periods of impaction approximate the eruptive periods of the permanent teeth, being evident from the second to the seventeenth year or later in greater or lesser degree. (Fig. 1.) These are the years in which the child grows rapidly, forms habits readily, obtains its greatest amount of schooling, develops nervousness, defective vision, twitchings, blinking, teeth-gritting, adenoids, enlarged tonsils, etc. Within these years children's diseases, including dental ca-

FIG. 1.



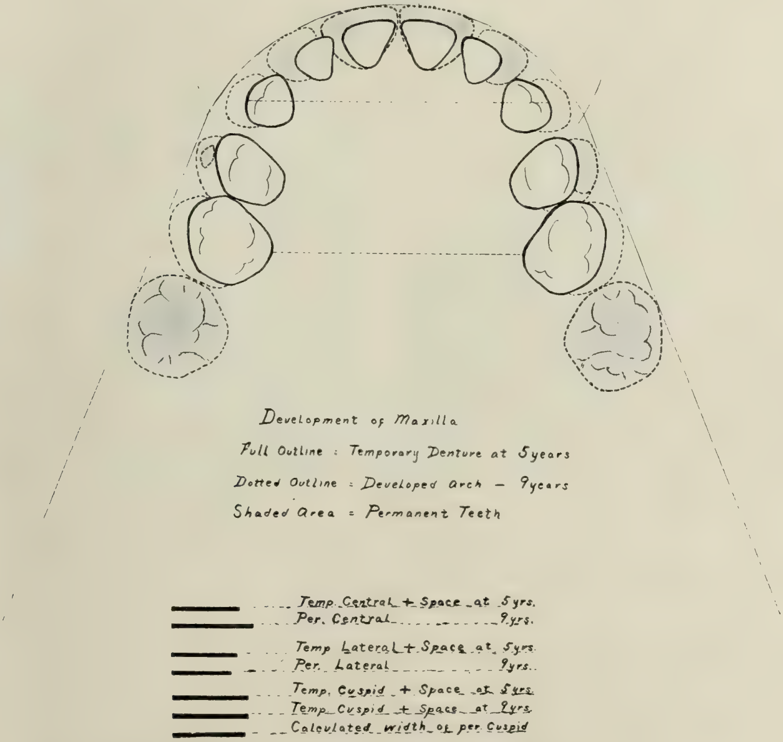
A, Deciduous molar at fourteen years, causing pain and impaction of bicuspid. B, Impacted canine (thirteen years) causing eye-strain and aggravating mental defects. C, Laterals impacted (eight years). D, Central, lateral, and canine impacted, with a resultant blinking of the eyes. E, Central and supernumerary impacted. F, Central and second supernumerary impacted beneath large supernumerary incisor (fifteen years). Pain and facial twitching on corresponding side of face.

ries, perform their ravages. To sum up briefly, these are the stress years, in which the future health of the individual is insured or undermined.

IMPACTION AS A FACTOR IN IMPERFECT DEVELOPMENT.

Impaction, *i.e.* difficult teething at any age, while being a result of degeneration, is itself a great factor in further degeneration or health failure. Acting as it often does upon a weakened or defective organism at a critical period, and affecting the nerve and blood supply, it may destroy or alter function and may prevent development, or delay still further one which is defective or delayed. While impaction is usually but one of a series of factors of the vicious cycle which may combat an individual's health, it may be or become a determining or major factor. The removal of that factor may aid in the removal of other evil factors, and eventually restore a more healthy tone to the entire being.

FIG. 2.


Development of Maxilla
Full Outline : Temporary Denture at 5years
Dotted Outline = Developed arch – 9years
Shaded Area = Permanent Teeth
Temp. Central + Space at 5yrs.
Per. Central 9.yrs.
Temp Lateral + Space at 5yrs.
Per. Lateral 9yrs.
Temp. Cuspid + Space at 5yrs.
Temp. Cuspid + Space at 9yrs.
Calculated width of per. Cuspid

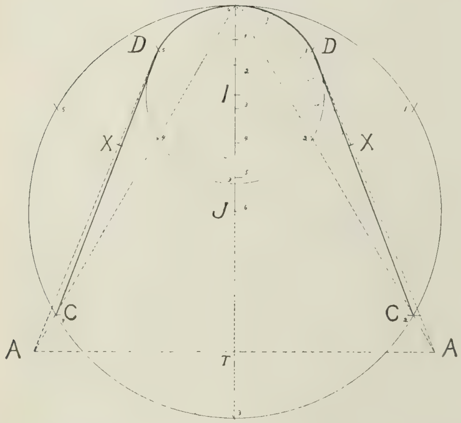
Development of dental arch at five and nine years.

Dr. Eugene S. Talbot says: "The eruptive fevers in children have a tendency to leave the system in a neurotic condition. . . . There is a general arrest of development of the whole body. Such persons not infrequently remain sickly, neurotic, or morally imbecile." Suppose we add to this pitiable result the evils of impaction, which undoubtedly would render a bad condition much worse, and might even destroy any chance for or delay recovery! But we do not have to suppose any such condition, for it really exists. Dental impaction is a result of early and a major factor of later defective development.

Dr. Talbot in his extensive writings has shown that dental irregularity and degeneracy, insanity, and developmental neuroses are closely related.

Dr. Henry Upson has clearly indicated a causal relation between impacted teeth and the common nervous and mental diseases. He has reported numerous cases of insomnia, melancholia, insanity, hysteria, and indigestion which have been cured by relieving the dental impactions present in each case. His treatment has been extraction.

Fig. 3.



Mathematical calculation of the smallest dental arch into which given teeth can erupt normally, C D D C. Bonwill's arch from the same teeth is A D D A.

IMPROPER ORTHODONTIC TREATMENT A CAUSE OF IMPACTION.

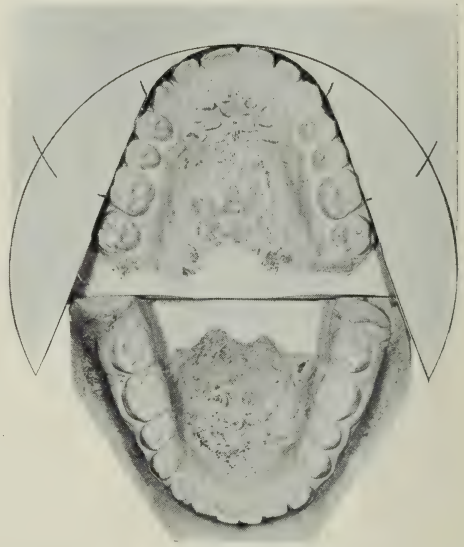
Dentists have known that excessive separative or orthodontic pressures when continued too long produce nervousness, extreme irritability, and suffering. Such pressures were impactive pressures.

Orthodontic pressure improperly applied is as great a factor in the causation of dental impaction as is excessive pressure. The application of force in the treatment of dental irregularities is too often made without due regard being given to the laws and forces of development. Particularly is this true in regard to the posterior movement of molars to provide a pleasing alignment of anterior teeth. Orthodontic treatments designed to provide for tooth-shifting and tilting in the mouths of patients over twelve years of age have been applied in much younger children, with the creation of posterior impactions as the evil result.

NORMAL ARCH DEVELOPMENT.

Before showing the effects of such treatment it seems advisable at this point to note what appears to be the normal plan of arch development; then, with the plan clearly in our mind, we shall better understand the formation of impactions, so as to outline a plan for a rational preventive treatment. The preventive treatment for dental impaction should be practically the same as that for dental irregularity, the two terms being often synonymous.

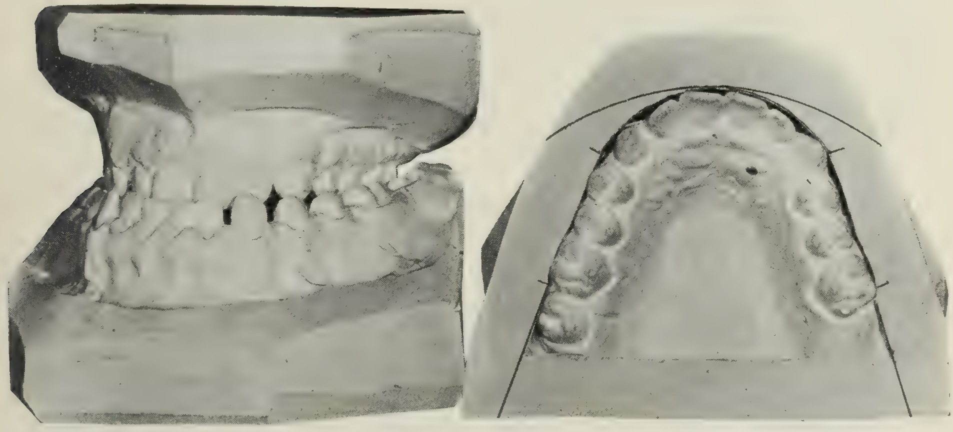
Fig. 4.



Comparison of the calculated arch with one of the best natural arches.

A study of tooth forms reveals rounded, convexed, and concaved mesial and distal surfaces as well as labial, lingual, buccal, and occlusal ones. These surfaces and forms indicate that the *teeth were evidently designed to erupt or be without lateral contact with any other teeth until* *they reach a vertical height equal to that of adjacent teeth in occlusion,* or until occlusion with teeth in the opposite jaw occurs. The sharpened or pointed cusps and the rounded surfaces indicate that the teeth were intended to pierce the gums and leave a ring of gum tissue designed and suited to contract about the constricted neck of the tooth, and at all times during the tooth eruption and gum shrinking to present the best possible approximation to the normal self-cleansing and protective functions of the gum tissue which is evident in the final state when the teeth are fully erupted and in normal occlusion. This means that the deciduous and permanent teeth must erupt without lateral contact; that before the permanent teeth erupt, spaces indicative of proportionate jaw development must be provided between the anterior deciduous teeth. These conclusions, based upon tooth forms, have been confirmed by actual observations of jaw developments and tooth eruptions. Nature provides that the deciduous molars shall exceed the succeeding bicuspids in mesio-distal diameter, evidently to provide for an easy eruption of the bicuspids just prior to the mesial movement of the first permanent molar and the eruption of the second permanent molar. Why should nature plan to prevent a wedging eruption in this part of the mouth and not in the incisal and canine regions? The full width of the incisor and canine crowns is attained between the fourth and sixth years. The incisors all erupt normally before the eighth year. At the fifth year the deciduous canines normally have distal spaces, which with the tooth provide more than enough room for the eruption of the permanent canine; thus at some time not later than eight years of age the child's jaw attains enough width to permit all the teeth to erupt, and no further width development is needed after that age. Observations on a patient of five years of age (see Fig. 2) revealed lateral and canine distal growth or developmental spaces which, with the respective deciduous teeth, more than equaled the width of the succeeding permanent teeth. The upper canine space persisted for four years, and up to the time of the eruption of the permanent canine at ten and a half years. The lower canine was in place at nine years. At five the central space plus the central width was less than the width of the succeeding permanent central. Before seven years, however, the space increased, and the increase in width between the laterals was enough to allow of easy erup-

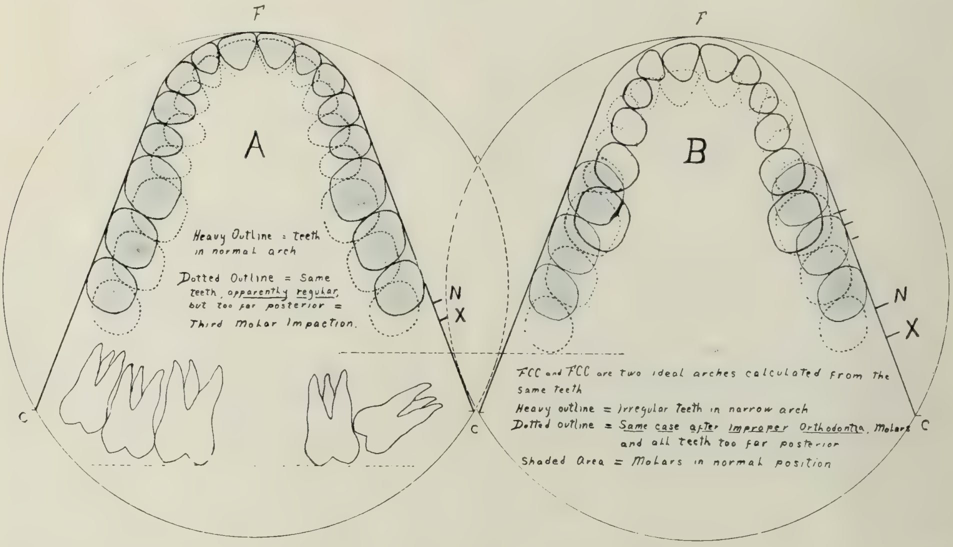
FIG. 5.



Calculated arch agreeing with natural arch which is too small for good facial balance. Upper teeth bite entirely within lower arch.

tion of the centrals, and equaled the increase in width which occurred in the jaw as measured across the molar region. This indicates that the width development was lateral, and must have occurred along the median suture—*a known region of development.* The evidence in this case is that the width development is complete before the seventh year. The suture, being a known region of development, must therefore be a known region of arrest in development, and the opening of the suture is the indicated curative treatment. This suture opening has been advocated also by Dr. G. V. I. Brown. The eruption of the central incisors marks the completion of the width development at or about the seventh year. This gives us the clue as to when to apply preventive treatment for dental irregularity and impaction. This *must be before the seventh year, and should be before the fifth or sixth year.* We may therefore expand the arch to its full limit before the seventh year.

Fig. 6.


F
F
A
B
Heavy Outline = teeth in normal arch
Dotted Outline = Same teeth, apparently regular, but too far posterior = Third Molar Impaction.
N
X
N
X
C
C
C
FCC and FCC are two ideal arches calculated from the same teeth
Heavy outline = Irregular teeth in narrow arch
Dotted outline = Same case after Improper Orthodontia, Molars and all teeth too far posterior
Shaded Area = Molars in normal position

A, Dotted outline shows positions teeth are liable to assume when erupting into too narrow an arch. N, Normal posterior of third molar; X, Abnormal or impacted position. *B*, Dotted outline shows posterior movement of teeth from improper orthodontia. Size of teeth is same as in *A*, and X in *B* marks a greater impaction than in *A*.

EXAMINATION AND CALCULATION OF NORMAL ARCH DEVELOPMENT.

Other cases of development watched confirm the observations and conclusions drawn from the last one. Recently I examined 980 Italian school children from five to fourteen years of age, and found 68 perfect mouths, or about 7 per cent. These 7 per cent. of perfect mouths passed the tests of sufficient growth spaces at five years of age, or before the eruption of the incisors and canines, to permit the eruption of incisors and canines anterior to the deciduous molars and without lateral contact until after occlusion; also the deciduous molar spaces were maintained to permit the eruption of the bicuspids to occlusion and then to permit of the mesial movement of the first permanent molar prior to the eruption of the second molar. All of these teeth were regularly arranged and the arches normal. The faces were full, rounded, and normal, and the children were the best in school. About 35 per cent. of the cases examined were so nearly perfect in many appearances that they would probably have been classed as perfect by general operative dentists, and in a prior examination had been so classed. These cases presented the evidence of lateral contact eruptions, the

FIG. 7.

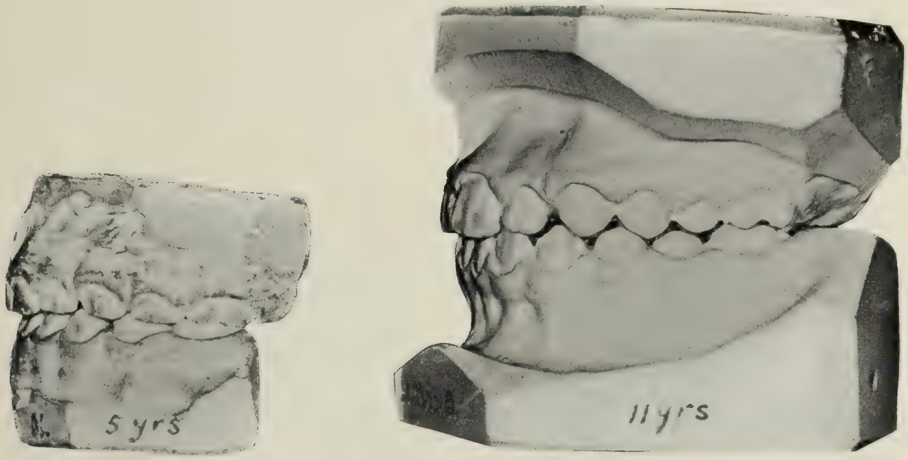
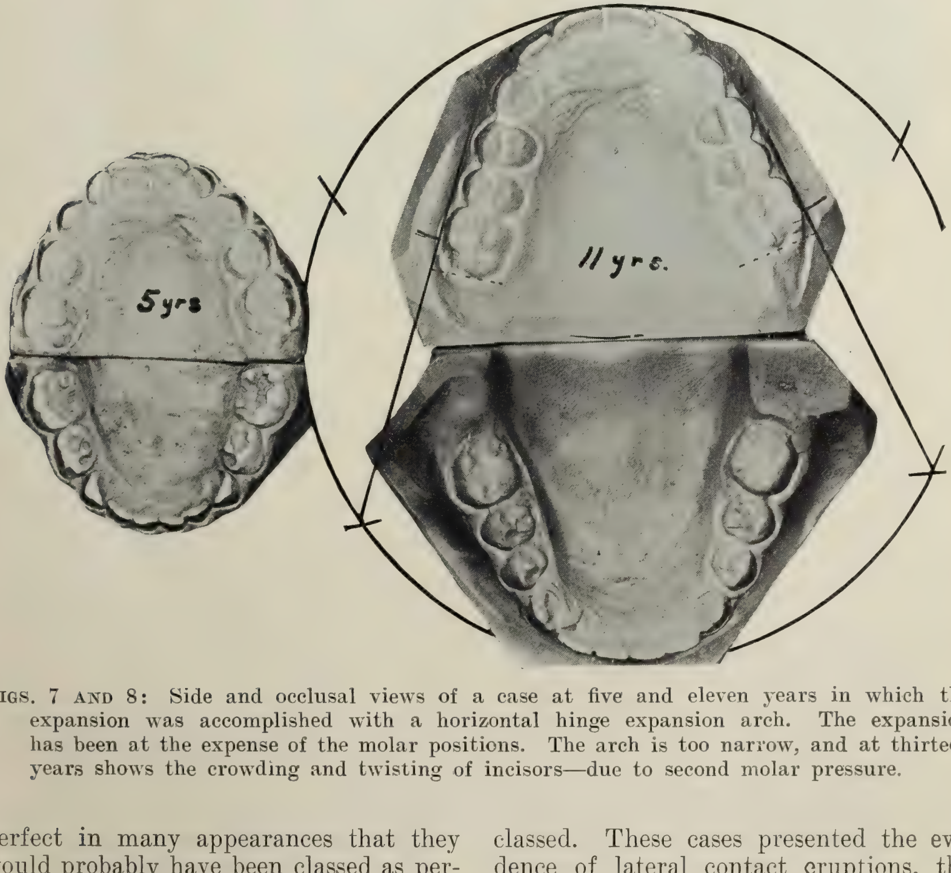


FIG. 8.



FIGS. 7 AND 8: Side and occlusal views of a case at five and eleven years in which the expansion was accomplished with a horizontal hinge expansion arch. The expansion has been at the expense of the molar positions. The arch is too narrow, and at thirteen years shows the crowding and twisting of incisors—due to second molar pressure.

deciduous molar spaces having been utilized to permit the eruption of canines and bicuspids without allowing any mesial movement of the first molars. In most of these cases the arches appeared regular and fairly broad, but the teeth pressed too tightly together, or there was excessive overbite, or both. The arches were placed too far posteriorly in the mouth. Each tooth had erupted a little too far posteriorly at the expense of the next posterior tooth.

In determining regularity of the teeth and freedom from impaction in eruption, the necessity becomes apparent of some ideal approximate calculation of the dental arch from the teeth which are to erupt into that arch. It was Bonwill who discovered a means of such calculation.

Bonwill's method of calculation. The mesio-distal diameters of the permanent central, lateral, and canine in combined width and used as the radius of a circle furnished the anterior arc of the dental arch. (Fig. 3, D–F–D.)

Fig. 9.

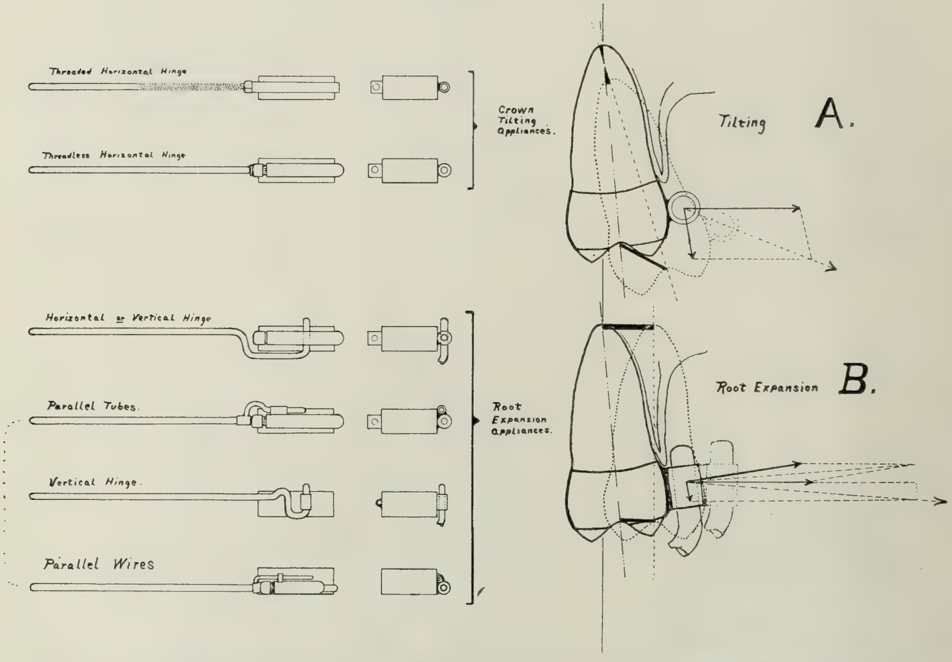
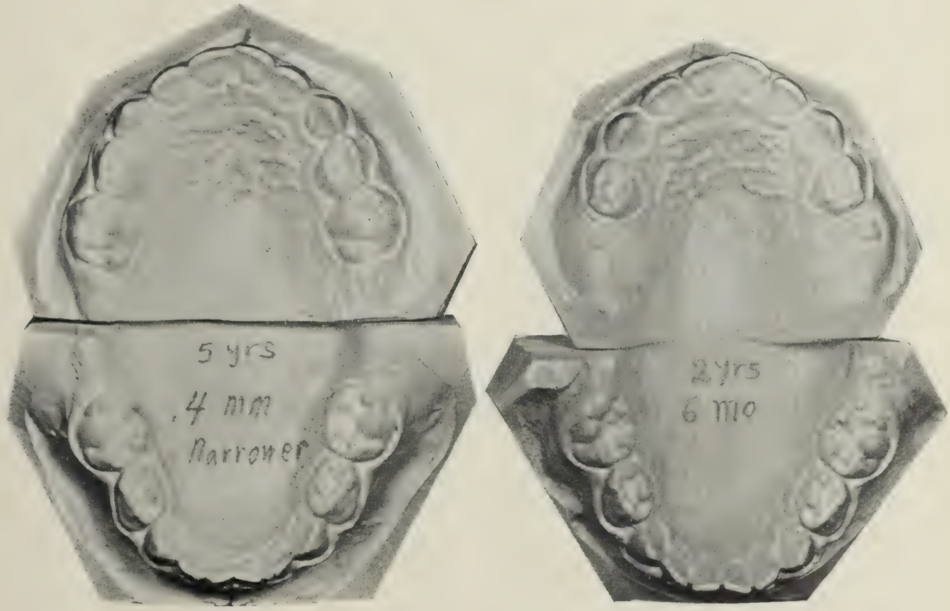

Threaded Horizontal Hinge
Threadless Horizontal Hinge
Crown Tilting Appliances.
Tilting
A.
Horizontal or Vertical Hinge
Parallel Tubes.
Vertical Hinge.
Parallel Wires
Root Expansion Appliances.
Root Expansion
B.

Illustration of the principles involved in tilting and root expansion appliances.

This calculation was proportionate to the teeth in each case. His calculation for the position of the remaining teeth was based upon an *average* measurement gathered from many cases. This constituted an error, which Dr. Hawley endeavored to correct by using average tooth measurements and calculating the dental arch from these averages—when the lateral and canine were not present. Hawley's determination also depended upon the accuracy in drawing a tangent, which is difficult and open to considerable error.

A new approximate arch. Adopting Bonwill's calculation of the anterior arc and drawing it (Fig. 3, D–F–D), I take six times the mesio-distal diameter of the upper central incisor, F–J, using it as the radius of another circle, F–C–C, upon which the radius is then taken to mark six arcs, as in Bonwill's circle F–D–D. These arcs mark the points C C, which are then connected to D D by lines D–C, D–C, upon which the mesio-distal diameters of bicuspids and molars are marked, giving the lateral width limits of the dental arch, D D and X X. *This furnishes a mathematical calculation of a coronal alignment arch proportionate to the teeth,* and is the smallest arch into which the teeth can erupt easily and without lateral contact until occlusion. Broad or narrow teeth will furnish proportionately broad or narrow arches. Actual tests of arches calculated in this manner have shown them to agree with the most perfect natural arches I could find (Fig. 4), and with the best orthodontic results. The calculation of these arches has revealed many instances in which the natural arch as found in the mouth agreed with or was greater than the arch calculated from the teeth, while at the same time the facial contours did not agree in the indication that the dental arches were in perfect positions. This may indicate that the teeth were too small for the jaw development provided. An example of this is shown in Fig. 5. If this is true, and it appears to be, the converse must be true. In some cases teeth are formed too large for the jaw development provided. This does not mean that symmetrical development can never be attained, for there are many cases in which, if treated properly and early, expansion and development of a considerable area beyond the dental area may be produced, and most pleasing results may be obtained without the extraction of any permanent teeth. The same cases, if treatment is begun at from eight to ten years of age or later, may not be so yielding to treatment, and may result in too full expansion, or the alternative, *i.e.* extraction.

FIG. 10.

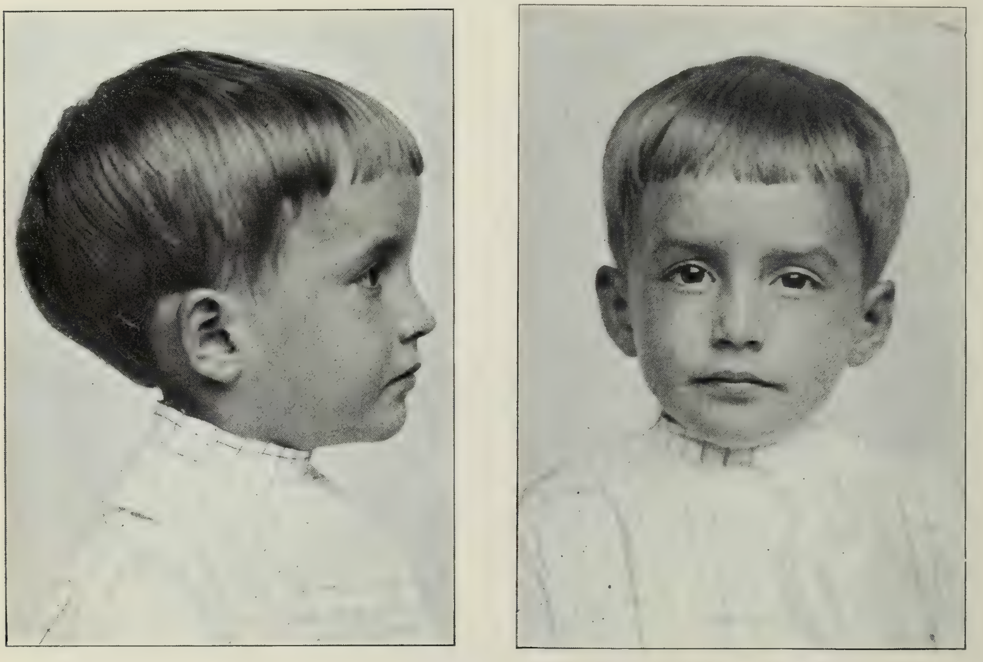


Occlusal views of teeth before treatment began. The arch at five years was 0.4 mm. narrower than at two-and-a-half years.

ARCH CALCULATION AS AN INDICATOR FOR PROPER AMOUNT OF EXPANSION.

The *intelligent* use of this calculated arch will indicate the amount and direction of expansion. *It must be used as a coronal alignment arch only,* the inclinations of the teeth and the palatal arch indicating the size and shape of the apical arch, which should be proportionately full, the apical arch outlining the apices of the roots. *The dental arch may be fully attained, and still be too far anterior or posterior in relation to the rest of the skull.* This must be understood and considered. The calculated arch therefore, as demonstrated, is the *smallest arch* into which the teeth may erupt easily—its posterior placing may mean second or third molar impactions with anterior close bites; its anterior placement means too full lips and facial disfigurement. To either of these evils judicious extraction would be preferable.

FIG. 11.



Large cranial and small maxillary and mandibular development.

The tests of this calculated arch indicate that it is the ideal arch, as Bonwill believed, and when the teeth are anywhere near the ideal size for an individual, this arch is the *best approximate coronal limit for expansion* and guide in the relief of impactions and dental irregularity.

There have been cases in which teeth have erupted into too narrow or too short an arch, and have become apparently regular. The result of such an eruption is wedging or impaction; each tooth as it erupts encroaches a little on the territory of the next posterior tooth. If the permanent teeth are small in proportion to the deciduous ones, but little evil may result, but if the permanent teeth are of normal or greater size, the impaction may be severe anteriorly to the first molars, or become apparent only later in the very evident malposition or impaction of third molars. (Fig. 6, *A*, x.)

EFFECTS OF INJUDICIOUS ORTHODONTIC TREATMENT.

Improper orthodontia is productive of impactions. A certain well-known type of appliance in which the first permanent molars are used for basic anchorage in moving all anterior teeth, as well as to expand the molars, is creative of molar impaction (Fig. 6, *B*). It temporarily relieves anterior stress at the expense of molar impaction. In this type of appliance a horizontal tube on the molar band is employed to carry the expansion arch to which the anterior teeth are ligated. Every particle of force applied to the arch must be accounted for. Equal pressure is put upon the anchorage and upon the teeth to be moved, with the result that the first molar must move backward or at best be held back, encroaching upon the area of the second molar, which may be impacted, or in turn impact the third molar. (Fig. 6, *B*, x.)

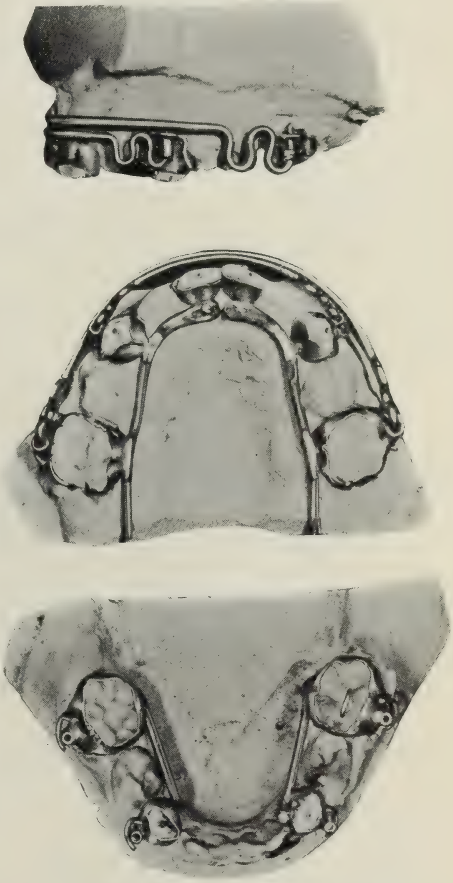
This type of appliance is being used in patients from four to ten years of age, anchorage being obtained upon the deciduous molars or the first permanent molar, with a resultant greater posterior shifting of unstable molars into the space that should be free for the proper eruption of subsequent molars. (Figs. 7 and 8.) The first permanent molar is unstable in position before the eruption of the second molar, and extreme care should be observed in placing pressure upon it before that time. This appliance is further inefficient in that it has a horizontal tube which acts as a hinge in lateral expansion and tilts the crowns buccally instead of moving the teeth bodily. It is strange that this good *coronal alignment appliance* should be used so generally and unscientifically as a universal appliance. (See Fig. 9, *A* and *B*.)

PRACTICAL PREVENTIVE TREATMENT.

The preventive treatment has already been partially indicated in the establishment of an approximately ideal arch which is proportionate to the teeth and calculated therefrom. Whenever we find the condition of difficult teething in the infant, we may be almost certain that irregularity and impaction will follow. The lack of spaces for growth before the age of from three to four years calls for their artificial production, to permit the permanent teeth to erupt easily. Development has been shown to occur chiefly laterally and along the median suture. Therefore the preventive treatment must be instituted by means of an appliance which will produce a lateral bodily movement of teeth and bone, open spaces to the calculated width before any incisors erupt, and open the median suture without producing any posterior pressure.

This can best be illustrated by practical cases. Fig. 10 shows views of a child's teeth at two and a half and at five years. The arch at five years was 0.4 mm. narrower than at two and a half years. He was a "bottle" baby through necessity, and great difficulty was encountered in obtaining even a living feeding. Teething was extremely difficult, being

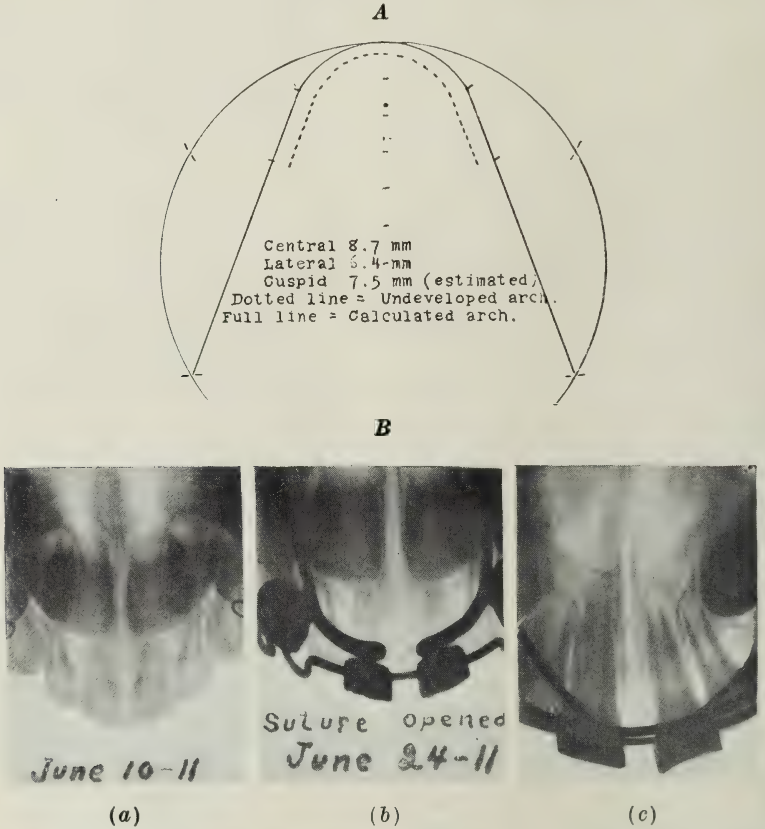
FIG. 12.



The appliances used to expand and open the median suture. Note the double vertical hinge arches, the lock springs, the lingual attachment wires which are also flattened to form bite-planes, and the double spring loops.

accompanied by irritability, sleeplessness, indigestion, and fever. I lanced repeatedly and thoroughly, immediate relief following in every instance. This was done after the physician's attempt to control by feeding had failed.

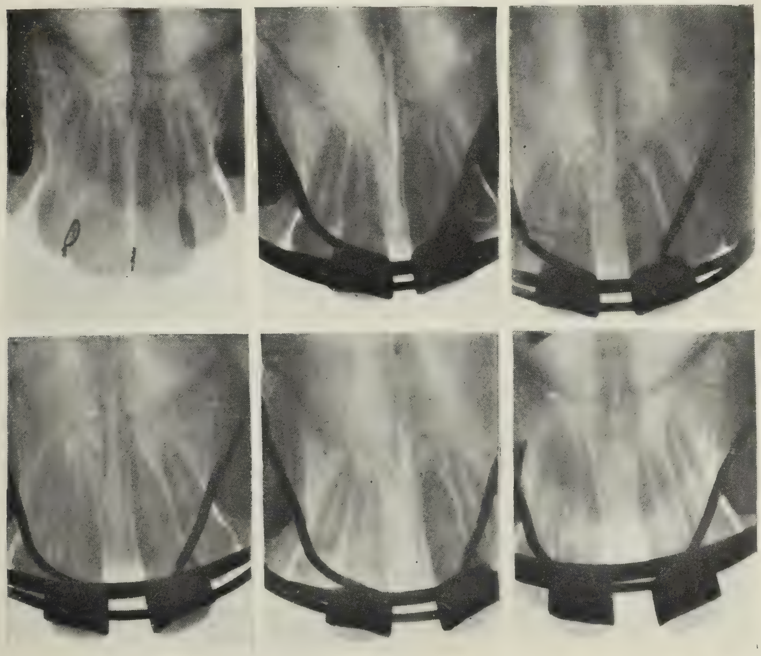
Fig. 13.


A
Central 8.7 mm
Lateral 6.4-mm
Cuspid 7.5 mm (estimated)
Dotted line = Undeveloped arch.
Full line = Calculated arch.
B
Suture opened
June 10-11
June 24-11
(a)
(b)
(c)

A, The arch of the deciduous teeth contrasted with the arch into which the permanent teeth should erupt, and to which the temporary arch is to be expanded. *B*, (*a*) Radiograph before opening of suture, and showing size of permanent teeth. (*b*), The suture opened—X ray by Dr. E. B. Lodge. (*c*), X ray of another suture opened in the same manner—X ray by Dr. Hill.

The large cranial and small maxillary development associated with the necessary artificial feeding enabled me to diagnose dental irregularity and impaction before any deciduous teeth appeared. Fig. 11 shows the patient's face at five years of age. At this period I felt the necessity of beginning the preventive treatment before other symptoms of impaction became evident. An appliance was made, using the principle advanced by Dr. Ainsworth, but much modified and improved. Fig. 12 shows the appliance for producing lateral expansion and opening the suture. Fig. 13 shows radiographs taken by Dr. Lodge before and after the suture was opened, an interval of fourteen days. In (*c*) is illustrated another opened suture; the radiograph was taken by Dr. Hill. The approximate sizes of the permanent teeth were obtained from these radiographs—for the centrals 8.7 mm., the laterals 6.4 mm., the canines 7.5 mm.—and from these measurements the ideal arch was calculated as shown in the upper part of Fig. 13. The mother's teeth measured 8.6 mm., 6.4 mm., and 7.5 mm., respectively, so that the approximate measurements are probably nearly correct.

Fig. 14.

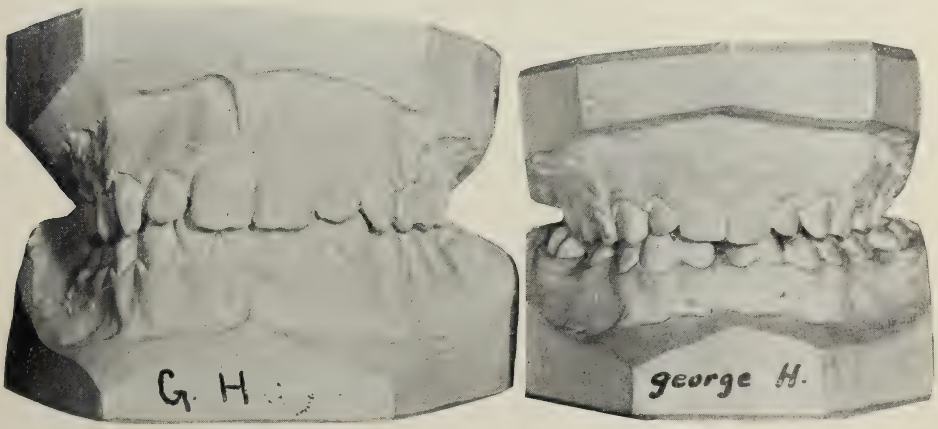


Feb. 10. *Feb. 23.* *Mar. 2.*

Mar. 10. *Mar. 16.* *April 14.*

The different stages of suture opening—X rays by Dr. E. B. Lodge.

Fig. 15.



Front view of the results of preventive treatment.

When the upper central incisor erupts, a correction can be made if necessary.

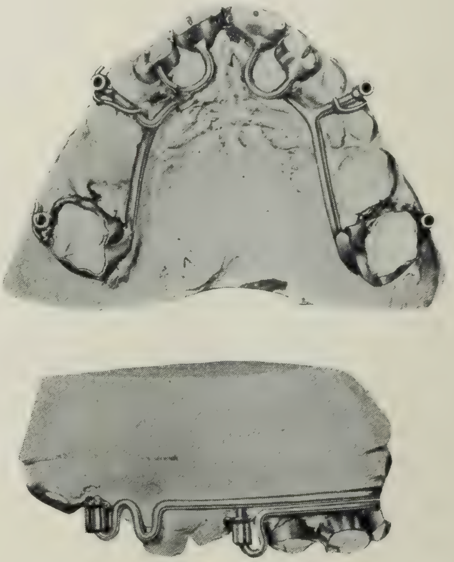
This will be in plenty of time, the first calculations giving an idea of the amount of expansion required, and later or intermittent treatments producing the actual amount required. The arch will be expanded so that the incisors and canines will erupt anteriorly to the deciduous molars; by this treatment the maxilla should be developed to harmonize with the large cranium. Fig. 14 shows different stages of suture opening.

Fig. 15 is an illustration of a case treated at a later age, namely, seven years. The expansion was lateral and anterior, and the facial and dental results are satisfactory. The irregularity and impaction have been relieved and prevented. The expansion has not been produced at the expense of the posterior teeth. General health is much improved.

Fig. 16, A, is an illustration of a case at nine years. More deformity is evident in the small arch, and in the malposition of the permanent teeth erupted. The deciduous canines being either lost or too weak, necessitated a modification of the appliance for opening the suture. The central, lateral, and molar were banded and attached by a soldered lingual bar, as shown. Opening the suture produces lateral expansion, opens the nasal spaces, improves breathing and blood supply, and in nearly every instance has reduced nervousness. In this case (see Fig. 16, B) it separates the central roots, which are too close together; after expansion has been secured the centrals are cut loose, and the crowns brought together, leaving a V-shaped space between the centrals, as it should be normally. This treatment does away with the cauterization of the frenum when it is abnormal in size and position. After the centrals are brought together and forward, the laterals are cut loose from the lingual wire and drawn forward and close to the centrals, thus opening sufficient space for the canines, with a minimum of posterior pressure. This case illustrates a type and a condition which is difficult to treat on account of the age, *i.e.* from nine to ten years. This is the transition period, in which the deciduous teeth are being shed, and the permanent teeth just erupting, both being unstable and offering little chance for bone expansion through attachments made to them. In many cases, in spite of all preventive efforts, a posterior and impactive movement of the molars takes place, or the molars remain too far posterior. Heretofore no treatment has been devised to overcome this evil except the intermaxillary elastic ligature, which shifted the evil result from one jaw to the other in a compromise which resulted in a bimaxillary posterior occlusion. This has usually resulted in a failure of retention, which has been charged against the retention device instead of to incomplete regulation.

Fig. 16.

(A)

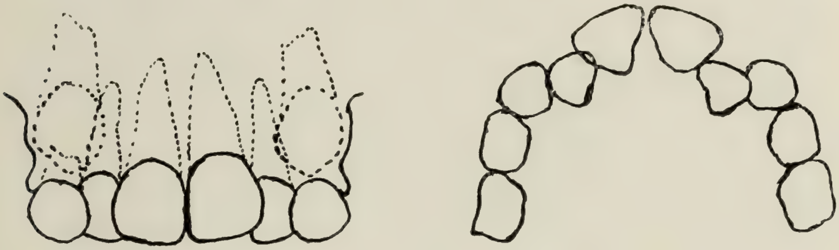


Modification of suture-opening appliance. *See diagram* (B) *opposite.*

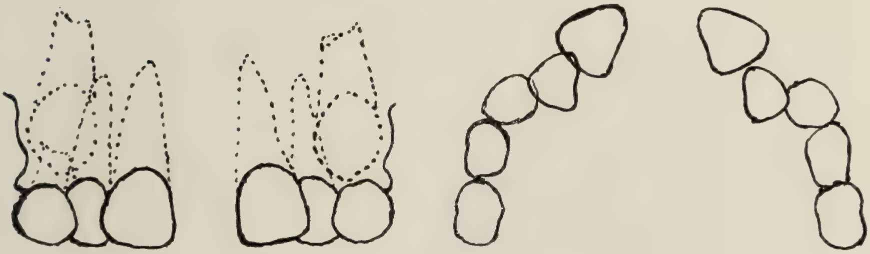
FACIAL ANCHORAGE DEVICE.

To overcome this difficulty, I devised in 1910 a facial anchorage or mask (Fig. 17), which, being patterned after a baseball mask and having strong elastics over and around the cranium, and an external labial arch, admitted of pressure, elastic or rigid, being exerted between the posterior teeth and the facial bones. This pressure can be used to move forward or

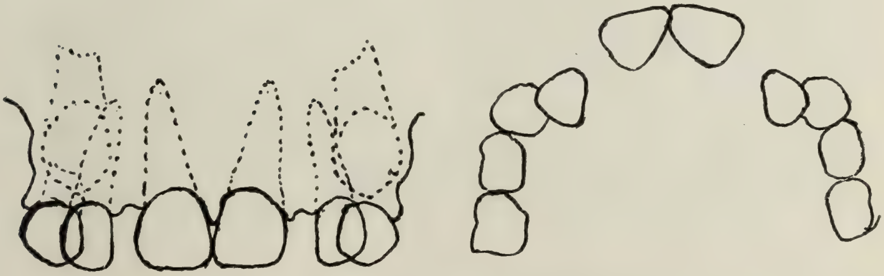
(B) *Diagram of the plan of arch expansion without creation of posterior pressures.*



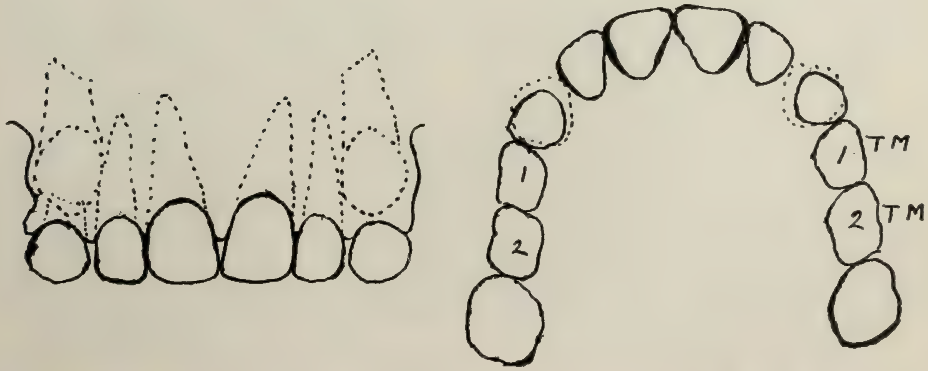
Impaction—narrow and short arches.



Lateral expansion—suture opened.

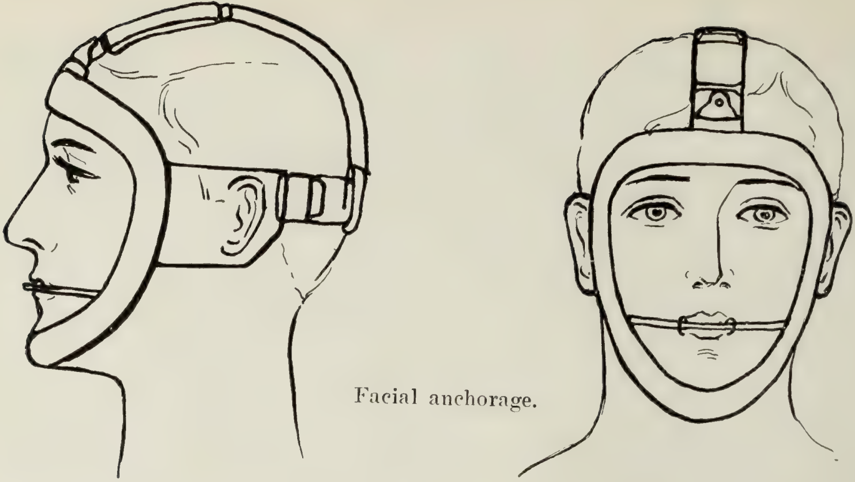


Crowns forced together and forward.



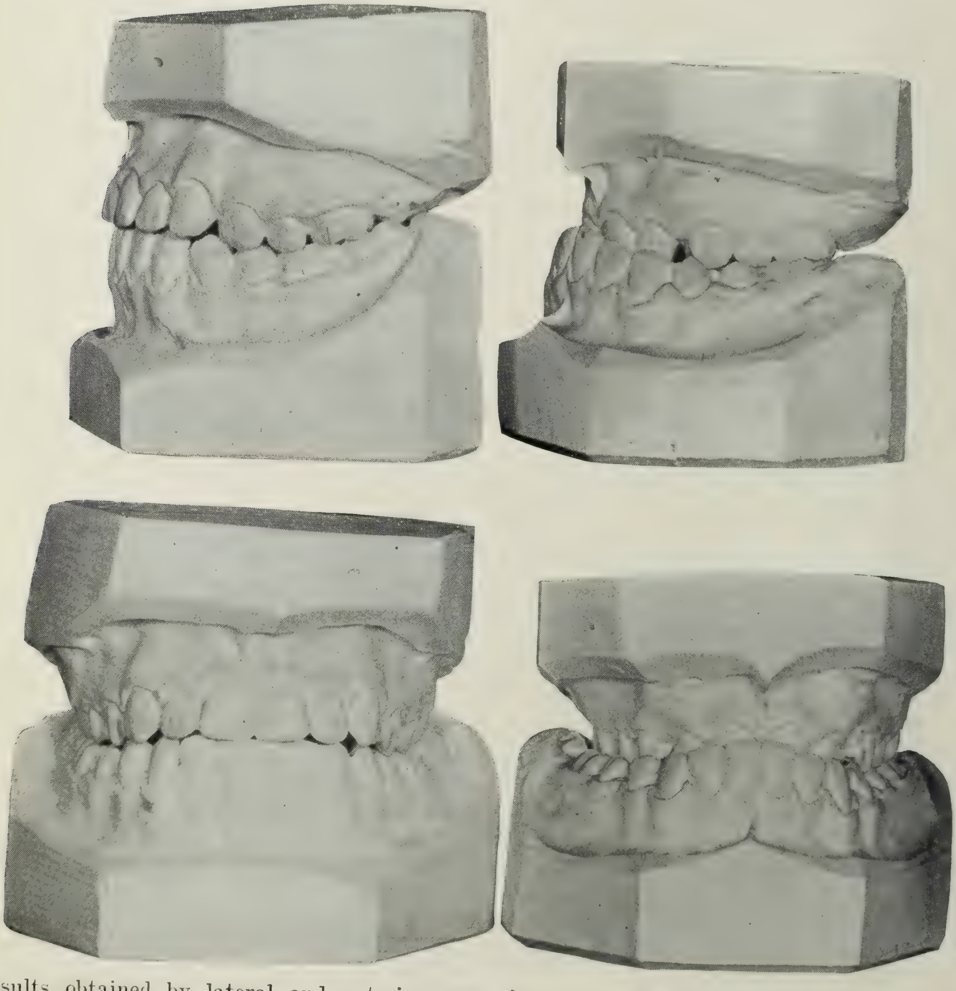
Laterals drawn to centrals and forward. Impaction relieved; broad arch; cuspid space.

Fig. 17.



Facial anchorage.

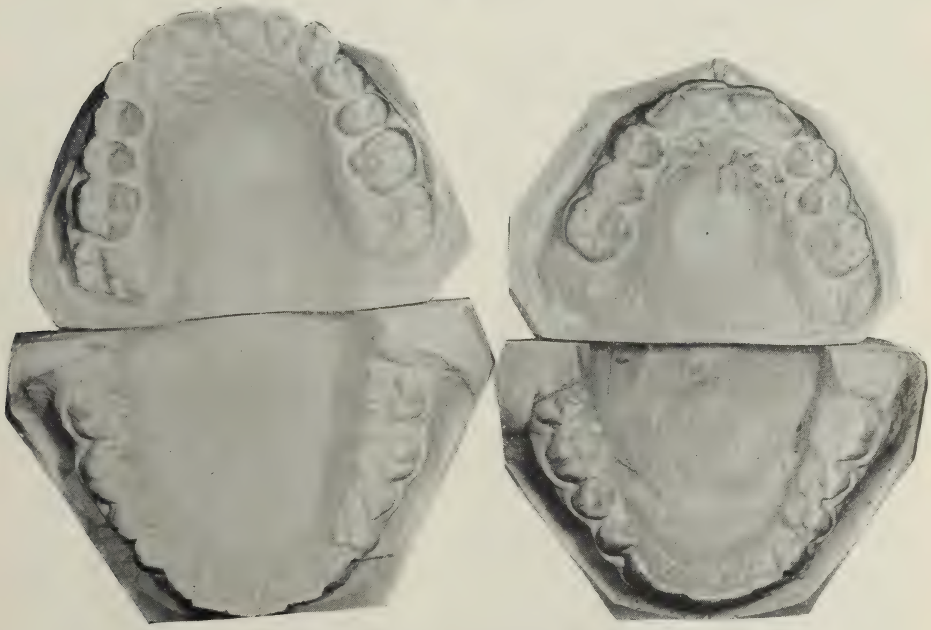
Fig. 18.



Results obtained by lateral and anterior expansion, but still deficient, and requiring **the** facial anchorage to produce an anterior movement of the maxillary teeth.

retain posterior teeth, or all teeth. This device has rendered possible the shortening of the time of treatment, and has offered in many cases the only alternative to the extraction of teeth. It promises success in many cases that without its use could only result in partial failure. First and second molars, in fact all the anterior teeth, can be pulled forward to relieve and prevent third-molar impaction.

Fig. 19.



Illustrating same case as Fig. 18.

Figs. 18 and 19 illustrate a case in which the lateral or buccal and anterior expansion has been accomplished with the vertical-hinge expansion appliance, the suture having been opened. The intermaxillary elastics have been used, with the result that the lower teeth drifted backward and opened the bite too much. The case was then allowed to rest a considerable time; then the facial anchorage was devised and applied to the upper teeth, and is now carrying them forward and building out the corresponding portion of the face.

Figs. 20 and 21 illustrate another case of lateral expansion with suture-opening, before and after expansion to the ideal arch. The patient, a child of eight years and eight months, was nervous, had a sallow complexion, and suffered continually from indigestion. Her eyes blinked and her face twitched. The general condition was such that the parents feared the effects of orthodontic pressures.

After studying the case I felt certain that a rational treatment would materially benefit the child, and informed the parents that the orthodontic treatment might and probably would improve the general health. Shortly after the pressures were applied, the health began to improve, the indigestion gradually subsided, and the blinking and twitching disappeared. Now the patient's complexion is clear and ruddy, nervousness is not noticeable, and the general health is fine. During the past winter the child did not suffer with the colds to which she was subject in previous years. Prior to treatment the child was a nasal breather and slept well; therefore the remarkable results since treatment would appear to indicate that the removal of a nerve irritant, and improved occlusion, were more responsible for the improvement than the increased oxygenation also supplied, although all these three were contributing factors.

Fig. 20.

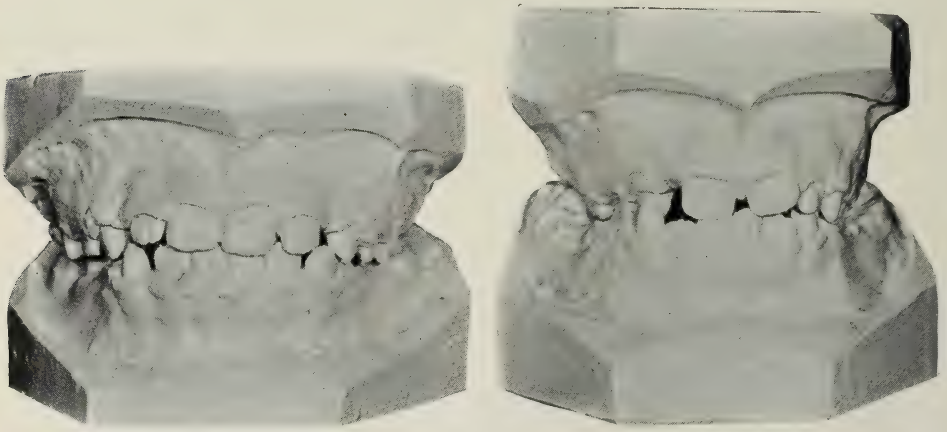
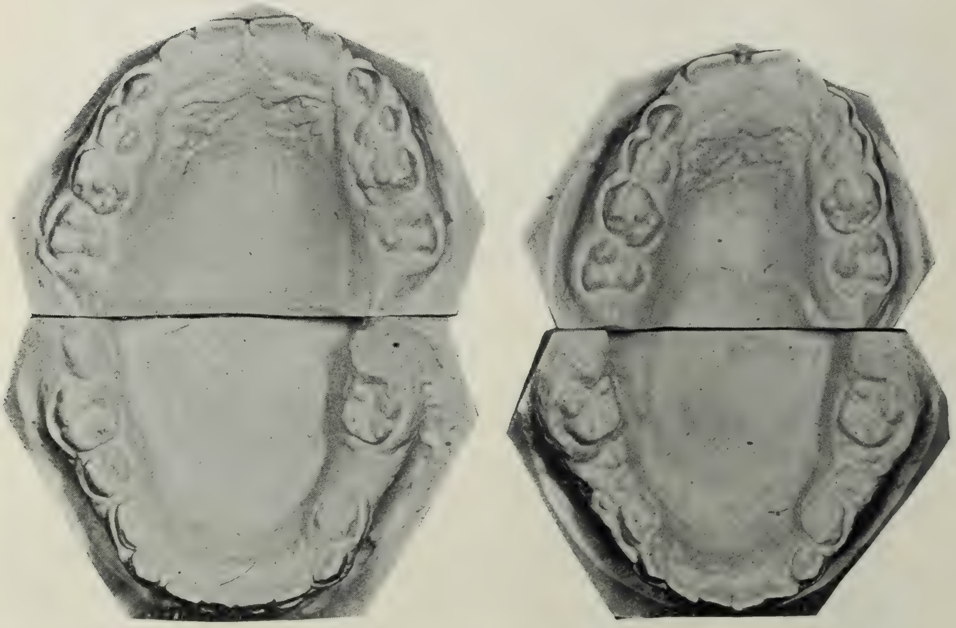


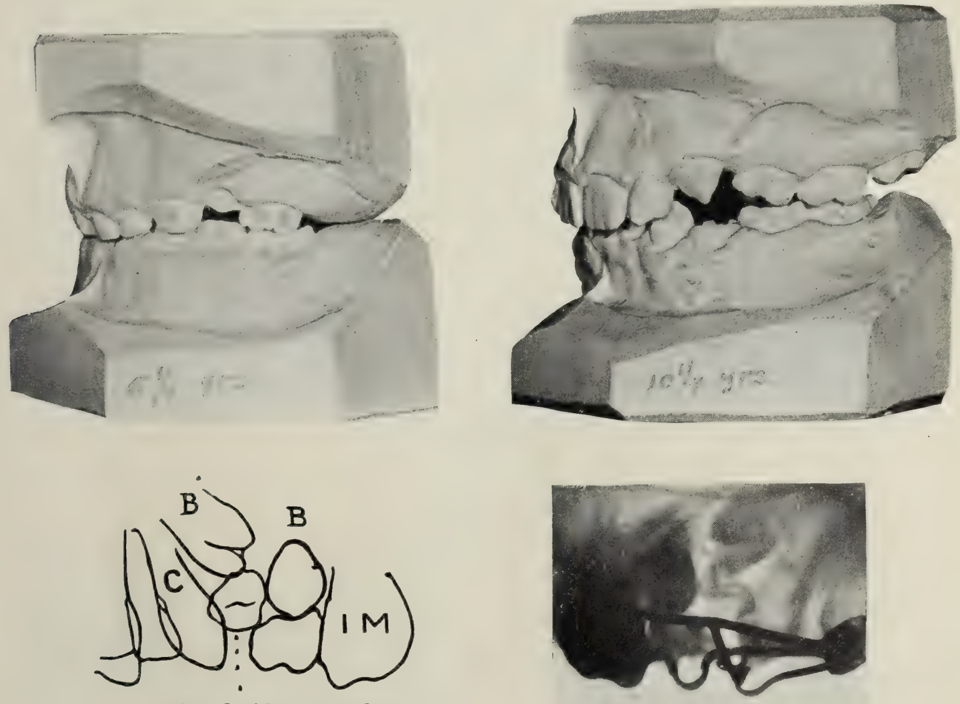
Fig. 21.



Figs. 20 and 21: Before and after lateral expansion, which opened the suture, then permitted anterior expansion without posterior pressures. In this case the general health improved greatly, nervousness and indigestion disappearing.

Fig. 22 shows casts made from a child at five and a half and ten years and three months of age, showing the extreme and premature mesial movement of the first permanent molar on the left side, the shortening of the first deciduous molar at five and a half years, the absence of that first deciduous molar in the coronal arch at ten years. The radiograph shows that the first deciduous molar had disappeared into the gums and alveolus some time between the seventh and tenth years. The deciduous molar, owing to the double pressure from the prematurely erupting canine and the second molar, has been forced up, and in turn forces up the first bicuspid. The child was wild, irritable, extremely nervous, and most difficult to handle. At five and a half I had attempted to expand the arch with the single-molar anchorage appliance, but was able to accomplish only very little in the anterior region. At that time I attributed much of the nerve irritation to the dental irregularity, but could not convince the family physician, and the case was left to itself for three years. The conditions became worse, the mother and physician became satisfied that the teeth were responsible, and the child was again put under my care.

FIG. 22.

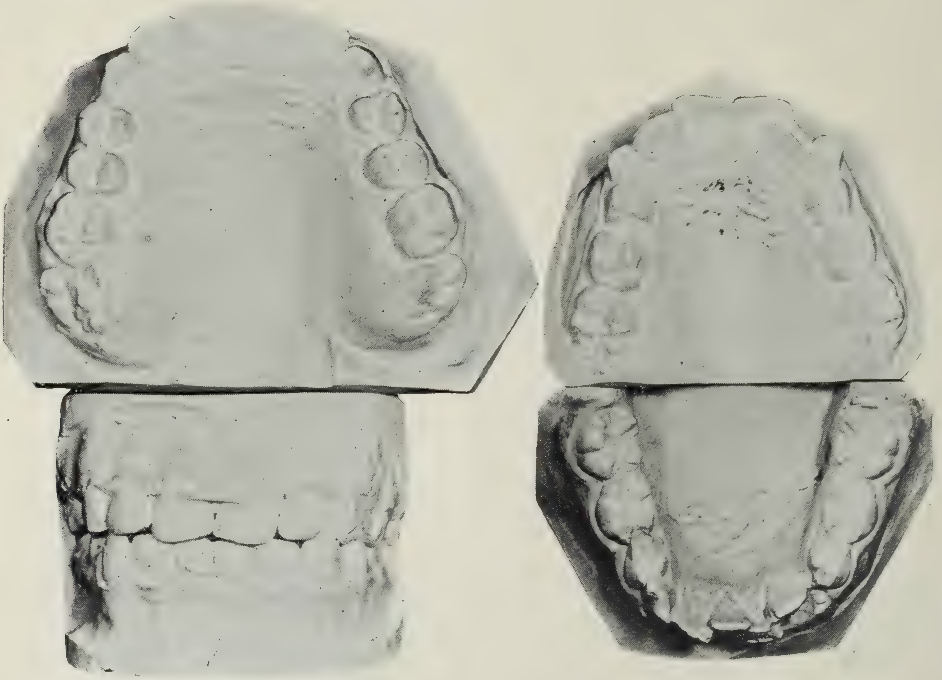


1st deciduous molar.

Casts showing conditions in a case at five-and-a-half years and at ten-and-a-quarter years. The upper left first deciduous molar disappeared entirely within the alveolus and increased the impaction of the bicuspid.

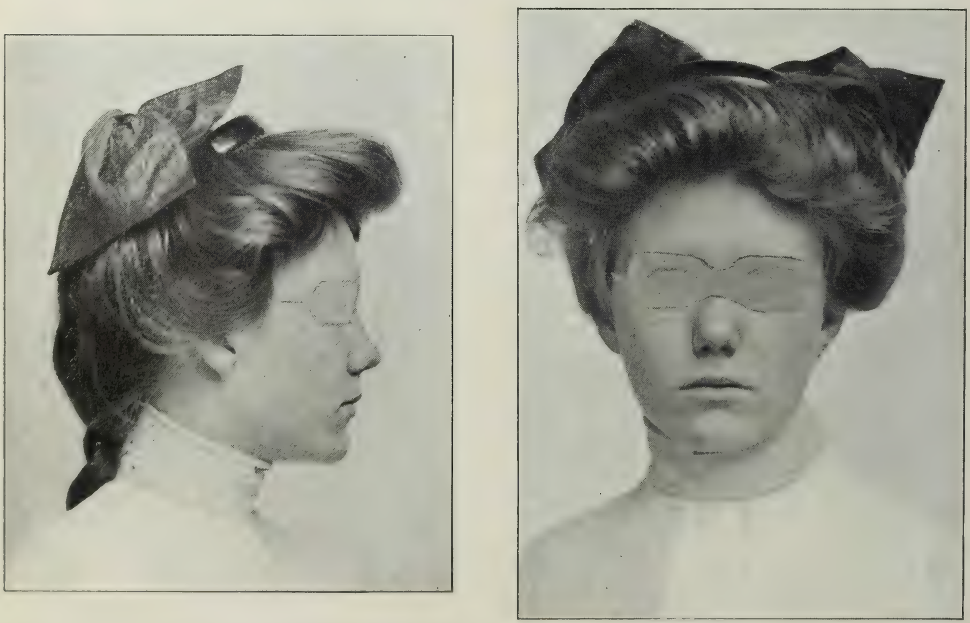
I at once applied the root-expansion appliance and opened the suture, with a little relief of the nervous irritation. This case not responding as usual, I became suspicious of the deciduous molar region, had it skiagraphed, and found the conditions as shown above. Both the deciduous molars were then extracted, with immediate relief for the patient. The expansion was continued rapidly, the incisors were brought forward and together, and room was made in the coronal and apical arches for the bicuspids and canines. The canine was forced forward, and the bite opened. The child now is

FIG. 23.



Before and after suture-opening and lateral and anterior expansion to calculated arch.

FIG. 24.



Profile and front view of same case as Fig. 23.

a most tractable patient, happy, serene, and gaining rapidly in health and weight. The nervousness is well under control.

Fig. 23 illustrates the case of a girl of eleven years and two months, with large teeth and extremely small arch. Complete expansion was accomplished.

Fig. 24 shows the face of the same patient after the expansion to the theoretical limit; no undue fulness is observed. We may accept this as proof that by a rational orthodontic treatment, without posterior movement of teeth, impaction can be relieved without extraction, and still the features be left in an harmonious and refined contour. It is not a proof that all such cases may be so treated. When extraction is necessary to relieve impaction after other rational methods have proved inadequate, it is still necessary to expand to the lateral limit, in order that anterior impactions be relieved and the nasal tract enlarged.

CONCLUSIONS.

The preventive treatment for dental impaction consists in an early orthodontic operation, which must provide for the easy eruption of the permanent teeth. The operation must be made upon the deciduous teeth, and the arch should be expanded anteriorly and laterally, and not at the expense of posterior teeth.

(The possibility of creating impactions of posterior teeth was first suggested to me some eleven years ago by Dr. Henry Barnes, and I am much indebted to him for his warning. I have been further aided by Dr. M. H. Cryer, whose writings at later date have confirmed the fear of the possibility of creating impactions by the posterior movement of molars.)

A CASE OF DENTAL AND FACIAL RESTORATION BY PORCELAIN JACKET CROWNS.

By L. A. HAWKES, D.D.S., Ambridge, Pa.

HISTORY.

THE patient, Mr. T., presented during the early part of September 1909, to be relieved from toothache, stating that in the near future he expected to have all his teeth extracted, several prominent dentists having held out to him no other hope than extraction and the wearing of full plates.

The patient was consequently thoroughly discouraged. After being shown the improvement that could be obtained from lengthening the bite, which was done by placing a quantity of bite-wax between the teeth and allowing the soft tissues of the face to resume their normal appearance, thereby relieving the horrible distortion as shown in Figs. 1 and 2, he decided that even in the event of failure the necessity for extraction would at the worst be hastened but slightly, and placed himself in my care, as he termed it, "for better or worse."

POSSIBILITIES OF THE PORCELAIN JACKET CROWN.

This patient had never even heard of the possibilities of the porcelain jacket crown, the thoroughly practical value of which, if properly applied, is clearly proved by the results obtained in this case. In my practice I have inserted quite a number of these crowns during the last few years, some of these supporting an additional tooth, and I have yet to learn of a single failure. The results obtained are ample reward for the many months of experimenting spent to obtain the degree of accuracy of workmanship necessary for this work, which

FIG. 1.

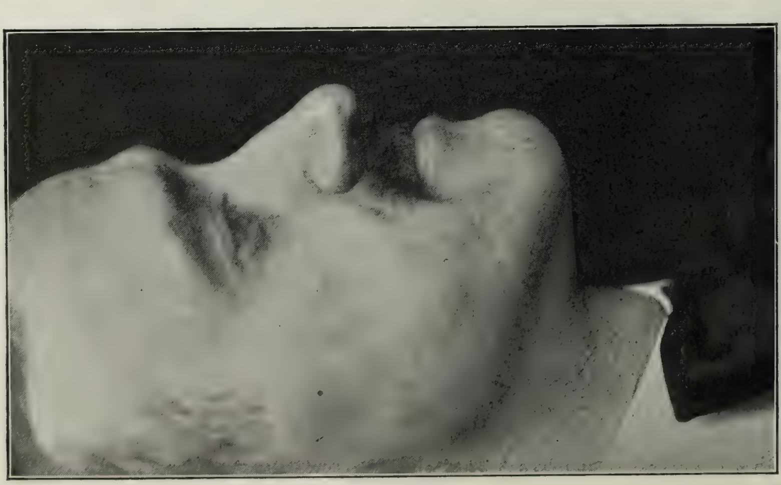


FIG. 2.

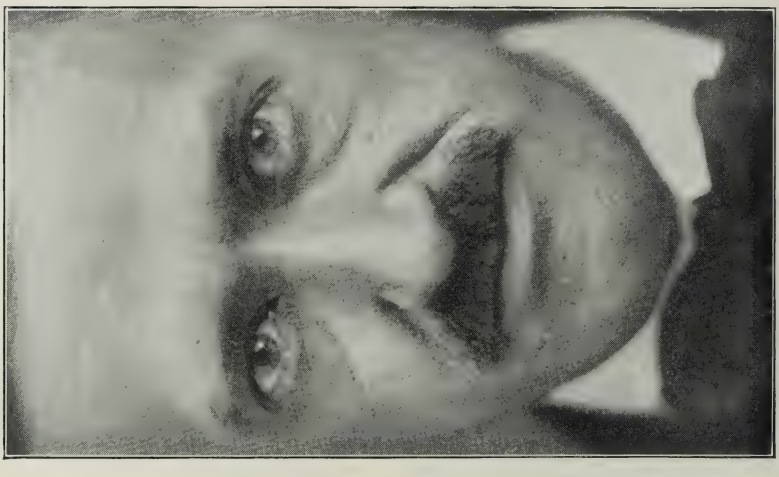


FIG. 3.

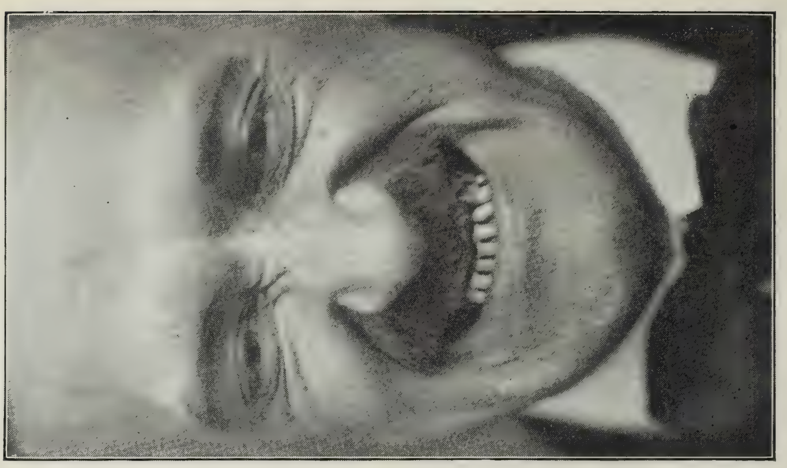


Fig. 4.

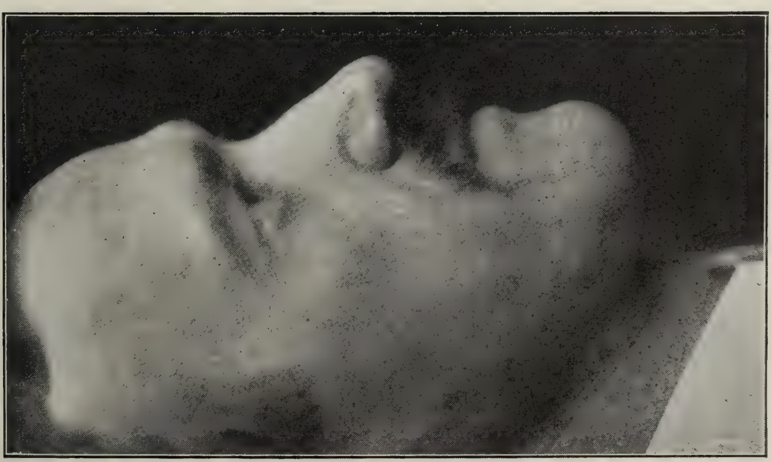


Fig. 5.

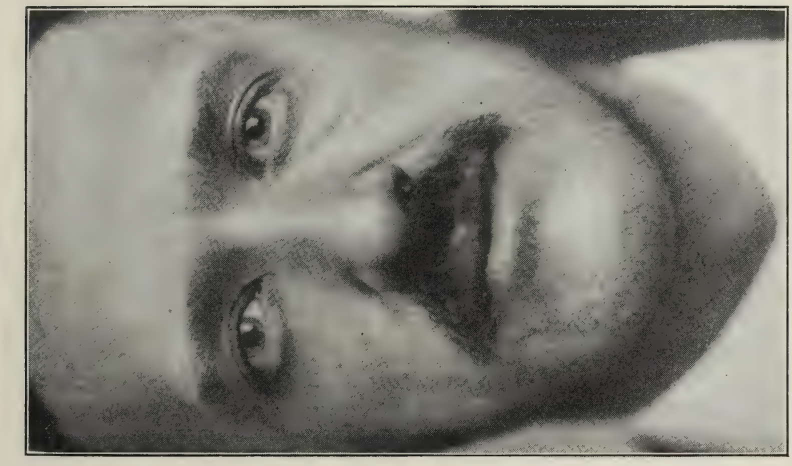
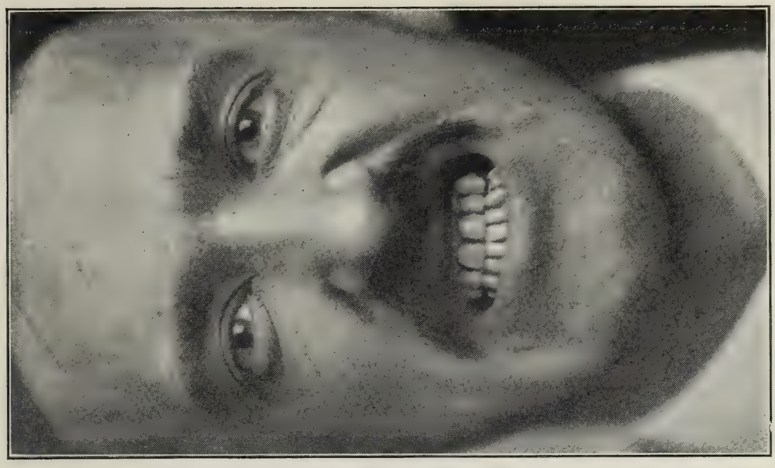


Fig. 6.



is truly the highest attainment of dental art.

DIAGNOSIS.

Diagnosis showed the molars and bicuspids in both jaws worn down so badly that the outlines of the pulp chambers were distinctly visible, though these teeth were not sensitive. In the lower jaw, the second bicuspids and the first and second molars on each side were missing, as were the second bicuspids and first molars on each side and the second right molar in the upper jaw. In the upper anterior teeth, owing to the absence of the teeth normally performing mastication, the enamel was worn away very badly on the labial surfaces, exposing the dentin from the incisal edges to within about one-sixteenth of an inch of the gum line. These teeth were vital, and no caries was apparent. Through using the anterior teeth in eating, the mandible had been thrown forward, gradually allowing the lower teeth to overlap the upper ones, and producing the appearance of lower protrusion shown in Fig. 1. Subsequently the soft tissues had been forced out of place as far up as the eyes, deepening all the lines of the face, particularly about the nose and eyes, and imparting to the tissues a puffed appearance. Though but thirty-five years of age, this patient was often taken to be over forty-five years old. Even the eyelids were no longer normal, the patient apparently being unable to open them to their full extent. (See Fig. 1.)

The photographs in Figs. 1 to 3 were taken previous to operating, and have not been permitted to be retouched; those in Figs. 4 to 6 were taken after the case was finished, and have also been left unretouched.

TREATMENT.

The treatment was started about September 1st, and finished on December 24, 1909. First the few posterior teeth left were devitalized and the missing teeth replaced by bridge work of sufficient height to allow the upper anterior teeth to appear on a level with the incisal edges of the lower ones. These bridges, by which the articulation was perfected, were cast in gold, no porcelain facings being used. In the upper right canine a porcelain inlay was inserted, while the remaining five anterior upper teeth as well as the lower centrals were crowned with porcelain jacket crowns, making seven such crowns in all.

The pulps in all the anterior teeth are still vital and in perfect condition. The lower laterals and canines were ground down slightly for the sake of appearance. Owing to the patient's complexion and age, shade No. 40 of the S. S. White porcelain body was used.

RESULTS.

The results were most pleasing both to the patient and to myself. The lips assumed their normal appearance (see Figs. 4 and 5), and the heavy lines about the eyes and nose were perceptibly reduced, the face appearing longer and less puffed. The eyes seemed to have gained additional vivacity, producing a generally more youthful appearance. Examination of the case one year after the completion of the operation revealed the work to be in perfect condition, the normal use of the full complement of teeth not having proved too strenuous for the porcelain jacket crowns to withstand, although the patient uses them without any restraint. He states that he never stops to realize that his teeth are artificial. The lines of the face are even less in evidence than they were when the last photographs were taken. The prospect of the patient's wearing full plates is removed for an indefinite period. Figs. 5 and 6 show the improvement in the anterior teeth, both these photographs having been taken with the teeth in occlusion; in Fig. 5 the upper lip is raised sufficiently to expose the gum line.

The results obtained in this difficult case may aid in dispelling the doubts still being fostered by some members of the dental profession in regard to the merits and possibilities of the porcelain jacket crown.

REVIEW OF A PAPER ENTITLED "WHEREIN CLINICAL EVIDENCE IS AT VARIANCE WITH EXTENSION FOR PREVENTION,"

As read by Dr. P. B. McCULLOUGH of Philadelphia before the Susquehanna Valley (Pa.) Dental Society, May 18, 1909.

By Dr. W. R. CLACK, Mason City, Iowa.

(Read before Section II of the National Dental Association, at its annual meeting, Cleveland, Ohio, July 26, 1911.)

THE reading of Dr. McCullough's paper (see DENTAL COSMOS, October 1909, vol. li, p. 1174) brought to my mind the story of the old whig who was an enthusiastic supporter of Harrison and Tyler in the campaign of 1839–40. Under the influence of the hard cider for which the campaign was noted he got into a fight, and received an injury to the brain that caused complete suspension of all perceptive and reflective faculties. He ate, drank, slept, and wandered around perfectly harmless, unheeding the stirring issues of the times, and the passing of the years. He was a familiar figure around the White House, and some returned army surgeons who made a diagnosis of his case reached the conclusion that the lesion of the brain was only temporary, and that an operation would in all probability relieve him. The operation was performed that beautiful morning in the summer of 1865 when our victorious army was marching, in grand parade, down Pennsylvania avenue in Washington. The anesthesia passed off, and the long slumbering brain, beginning where it had left off in 1840, resumed normal functions. Hearing the blare of the bands, the booming of the cannon, and the shouts of the multitude, the old whig sat up on his cot and shouted, "Hurrah for old Tippecanoe, and Tyler too!" and began to argue the questions of that memorable campaign. He could never be persuaded that old "Tipp" had slumbered with his fathers for a quarter of a century, that the civil war had been fought, and the question of state rights forever settled.

So with the essayist. He does not seem to comprehend that the question of "extension for prevention," which he thinks he is attacking, has been fought out and settled just as surely as the preservation of the Union.

I have been going to the Twin Cities for the last ten years to avail myself of the good to be gotten from association with one of the most progressive bodies of students of dentistry in the world. Most of this time my visits have been monthly, and I think that not once in the last five years have I heard extension for prevention discussed. It has passed the point of discussion and is accepted by the progressive dentist just as finally as asepsis is accepted by the progressive surgeon.

After reading an article like Dr. McCullough's, one is likely to think of that passage in Matthew: "Let them alone, they be blind leaders of the blind. And if the blind lead the blind, both shall fall into the ditch." This passage may have represented the spirit prevalent at the time when it was written, but a gentler gospel prevails today. While we may have no sympathy to waste on the man who is blind because he wilfully closes his eyes to the light of truth and progress, and apply these words to him, our sympathies should go out to the innocent follower who may unwittingly follow a blind leader to his own destruction. It is for the good of those young men who have not had the opportunity to know what extension for prevention really is that I am calling attention to the misrepresentations of the essayist.

Extension for prevention, as taught by Dr. Black and his intelligent followers, needs no defense or apology, but when a man in the public prints attempts, ignorantly or wilfully, to misrepresent the teachings of Dr. Black and his disciples as to what extension for prevention really is, it is time to call him to account. Every man has a right to his own opinion, and has the right to express that opinion, but has no right to misrepresent the expressed opinions and teachings of another.

The first criticism to be made of Dr. McCullough's paper is that he uses the term "extension for prevention" as a part of his text, as if that method were the prisoner at the bar, and then proceeds to talk about nearly everything that extension for prevention is not, and vainly tries to throw all the mistakes of those who do not use that method on extension for prevention.

I have caused to be circulated through the house copies of Dr. McCullough's paper, with the paragraphs numbered so that we may refer to them in this paper and in the subsequent discussion.

DEFINITION OF EXTENSION FOR PREVENTION.

I will first define the various kinds of extension, that we may not in our talk confuse them one with the other or with the so-called extension for prevention as taught by Dr. Black's near-followers and opponents. I ask that if in this definition I make one false statement I may be immediately interrupted, and that you, Mr. Chairman, will recognize any person so interrupting and allow him to set me right, so long as he speaks to the point at issue.

First of all I would state that extension for prevention means extension for the prevention of recurrent caries and nothing else. The words of Dr. Black are: "Extend until the cavity margins are in immune area, then stop;" also, "Any other extension is for some other purpose, and must not be confounded with extension for prevention."

Next is "extension for convenience," which is the making of every part of the cavity accessible and has nothing to do with extension for prevention.

Another kind of extension, designated by Dr. Wedelstaedt as "precautionary extension," deals only with those margins subject to heavy stress, and does not concern extension for prevention.

Is there one present not understanding these definitions and limitations? The rule given first is arbitrary; the margins must be extended into immune area, *i.e.* where the excursions of food, the tongue, and the lips shall cleanse those margins. Those lines may change on the surface of the tooth as the position of that tooth in the arch and its relation to the other teeth change, but the requirement does not change. The second requirement is more or less a matter of personality, but access must be had. The last requirement is a question largely of stress, its direction and amount.

PATHOLOGY OF CARIES AND EXTENSION FOR PREVENTION.

We will take up Dr. McCullough's paper by sections, and consider first those statements that refer to pathology of caries and extension for prevention.

> [Section 1.] The time of greatest susceptibility to caries in the average subject is during the period between childhood and puberty.

This statement we shall pass unchallenged.

> [Sec. 2.] The absence of scientific data explaining why, with the presence of the destructive microbes at all periods in the mouth, caries is not always active, permits the reasonable though empirical explanation of lowered vital resistance due to the increased demand on the nutritional supply while this important physiological change is taking place. As the histological and chemical evidence tends to prove that the difference in composition of the teeth has no bearing on their ability to resist decay, the only other ground for the above statement

would seem to be the effect which this state of disturbed nutritional equilibrium would have in modifying the oral secretions to the extent of their becoming media favorable to the development of the destructive bacteria.

Dental caries does not necessarily depend on changes in the oral secretions which favor the development of destructive bacteria. The number of these organisms present in the mouth may have no relation whatever to the progress of caries. The quantity of lactic acid produced in the mouth and mixed with the saliva has no relation to dental caries. That there is a difference in the oral secretions of persons susceptible to and immune to caries has been definitely demonstrated by Dr. J. P. Michaels of Paris, and considerable additional information has been given by the Committee on Research of the New York State Dental Society. These differences in the saliva need not in any way modify the multiplication of bacteria, but apparently an opportunity is furnished by which colonies of organisms may grow in contact with the surface of the enamel in sheltered positions in such a way that the acid which they form will not be mixed with the saliva, but will be held in concentrated form in contact with the surface of the enamel.

[Sec. 3.] It is the purpose of this paper to discourage radical technical procedures, from the belief that the technique of cavity preparation cannot be said to be scientific until the problems involved in the cause of caries in one case and its absence in another are better understood.

For the man who has been a careful, unprejudiced clinical observer for any reasonable number of years, no additional information is necessary to justify the putting into practice of all of the principles of extension for prevention. The man who does not understand these principles, and who has not observed the clinical conditions on which they are based, certainly should not employ "radical technical procedure."

[Sec. 4.] As the susceptibility or immunity of the teeth to decay is not due to any difference in structure, but to causes external to the teeth, it follows that a filling having no control over the forces responsible for caries must be an indifferent remedy during a period of continued activity of the disintegrating elements.

Because decay is not due to any difference in structure, it does not follow that a filling has "no control over the forces responsible for caries." It does control them to the extent that it is indestructible by those forces, and thus prevents recurrence of caries wherever it prevents those forces from coming in contact with tooth structure.

[Sec. 5.] A review of the histological investigations of the pulp by Miller, Latham, Talbot, Black, Broomell, and Andrews, together with a number of others, cannot fail to impress one with the delicacy as well as with the importance of this organ. A thought reflected by Dr. Latham in her statement in the *International Dental Journal*, vol. xxii, page 612, is: "One noteworthy point is the constant effort directed to the 'killing of the pulp' by every known means, and the very little encouragement to try to save the 'formative organ.' "

Pulp conditions cannot properly be considered in discussing the principles of extension for prevention, because extension for prevention has absolutely nothing to do with depth of cutting, but only with surface extensions which involve slightly more than the depth of enamel thickness.

[Sec. 6.] To quote from Andrews, *International Dental Journal*, vol. xxv, page 759: "The pulp fibrils are as much a part of the pulp as any portion of it, and are the channels by which its vital functions are carried on. . . . . . Each canal contains a fiber bathed in a fluid, and this fiber is an arm of the pulp. Branches from this fiber anastomose with others through the dentin matrix. They form a delicate network in the substance of the crown near the enamel. . . . . The function of the pulp is not only to vitalize, but it may again assume its formative function whenever causes for repair demand this action."

The statement quoted seems to carry the assumption that the exposing of a number of dentin fibrils is equivalent, or nearly so, to the exposure of the pulp itself, without reference to the depth of the cutting in the dentin. Millions of teeth in which cavities have been prepared and filled, and in which the pulps remain vital, are sufficient reply to this.

[Sec. 7.] Exceptional instances of this latter function are illustrated by Miller in the Dental Cosmos, vol. xliii, page 853, and in the *International Dental Journal*, vol. xxiv, page 649. With this last-named paper appear two photomicrographs, one showing a diseased pulp horn isolated by secondary dentin, and the other the isolation of an abscess of the pulp by a thin wall of calcific deposit.

If any man can show me any connection between this paragraph and extension for prevention, he will do me a kindness.

[Sec. 8.] The upper bicuspids, because of their form, are structurally the most delicate and as a rule are the first to be lost; therefore the phases through which these teeth only too often and too early are seen to pass in their retrograde change through life teach a lesson. The history of any one of them may be stated as beginning at the time of youth with an approximal cavity backed by a healthy pulp active in building a protective barrier opposite the point of invasion. The operator breaks in the marginal ridge, extends the cavity occlusally, gingivally, buccally, and palatally, exposing with accompanying irritation and pain the pulp fibrils, and packs a metal filling, the antithesis in conductivity to the insulating structure removed, and the pulp suffers its first shock from an artificial irritant.

I hardly think the records will bear out this statement. I think observation will show that many more first molars, both upper and lower, and upper lateral incisors are lost than bicuspids. The other statements do not apply to extension for prevention, but to the depth of cutting. If the pulp is endangered, there is ample clinical experience of the value of non-conductors for its protection.

[Sec. 9.] Years pass, when the filling is judiciously removed to relieve a putrescent pulp and to fill the canals aseptically. The cavity margins have already been extended to the "excursion line;" they need only to be shaved. A second filling is inserted, but without the step, and the second phase in the retrograde change is recorded. An accident enters next, and the buccal wall gives way. To preserve the palatal wall, a shell crown becomes the remedy, inviting fermentation at the gingival margin, until recurring pericemental necrosis and the forceps end the story.

The same is true of this paragraph; extension for prevention does not apply. I will have more to say of the methods spoken of here later on.

[Sec. 10.] Cases without number are in constant evidence in which gold fillings have been inserted in patients of from twelve to eighteen years, with resultant fistulæ appearing later in life, the operation speeding the devitalization, which often would have been delayed if no filling at all had been inserted.

This refers to the death of the pulp by injudicious operating, and has nothing to do with extension for prevention.

[Sec. 11.] When the average period of comparative immunity following puberty is considered, how much better this retrospect would be if the teeth had not received the radical operative interference characterized in the above brief summary.

The same may be said of this as of the three preceding sections.

[Sec. 12.] Considerations involving filling as a remedy should include the preservation of the pulp and the maximum strength of the tooth, both of which are obtained by economy of structure, the operator being mindful of the approach of that time of life when caries is least to be feared and the last stand is made to protect the soft tissues until atrophy destroys the last physiologic support to the peridental membrane.

The preservation of the pulp and the conservation of tooth structure are attained by extension for prevention if properly carried out. The "preserve" as used by the essayist applies to the future life and usefulness of the tooth. A cavity so economically prepared as to permit a recurrence of decay would not preserve the maximum strength of the tooth.

[Sec. 13.] A knowledge of the histological relation of the enamel rods is important for the intelligent understanding of the character of structure worked upon; this knowledge, however, cannot with reasonable practicability govern the character lines of cavity formation or marginal bevels.

[Sec. 14.] If the interprismatic cementing substance were more or less resistant than the rods, the accidental fracture of enamel would show surfaces following rod alignment; yet the characteristic angular fracture shows the direction of the application of the force bisecting the rods and the cementing substance exactly as if the rods and cement were one histological homogeneous structure.

The splitting of the enamel along rod directions may be easily demonstrated with a sharp chisel in the extension of almost any cavity, but has nothing to do with extension for prevention.

[Sec. 15.] Dr. Walkhoff, disclaiming Williams' idea of the cement substance, says that the rods are actually in contact. (*International Dental Journal*, vol. xxiii, page 719.)

[Sec. 16.] A beveled margin, as such, no more resists chemical action than does a square margin. Brittle substances like enamel are sensitive to mechanical injury from blows of the percussion type, such bodies resisting much greater force when gradually applied. The axial* margins of a filled cavity are not exposed to this sudden impact as may be the occlusal surface.

The idea in 15 is as ancient as the preserved eggs of the Chinese and neither is discussable in this intelligent and polite day, and as neither this nor paragraph 16 have anything to do with extension for prevention, we will pass them both.

[Sec. 17.] No filling material has at its square edge the edge strength of the square edge of enamel. The beveling of enamel margins for protection is illogical when the weaker body is to provide the protection. If beveling for protection is necessary for gold, then square enamel margins should fail with amalgam, offering less protection, and still more with inlays offering no protection when after a few weeks the cement at the surface disappears.

[Sec. 18.] Any technical method of procedure is objectionable in proportion as it is difficult of execution, for the reason that average skill is below the requirements. This truth seems to be recognized by the exemplars of dental manipulation, as instanced by the fact that, when the carious surface of a tooth is given for a clinic, that surface usually happens to be the mesial—for against the beveled walls of a cavity so situated it is so much easier to pack gold.

[Sec. 19.] Forming the gingival wall on a horizontal plane offers no advantage either as a means for prevention or as a base for seating a filling.

I cannot agree with the first statement, on which the others are based. The cavo-surface enamel is strong or weak according to the length of the rods composing the angle and their dentinal support. Neither this nor paragraphs 18 and 19 apply to extension for prevention.

[Sec. 20.] The area of greatest susceptibility to recurrent caries is at the gingival margin; whether the line of cavity formation at this margin be straight or curved can serve no purpose as a means for prevention.

This statement is correct so far as prevention of recurrence of decay is concerned, if the area of liability is included in the outline.

[Sec. 21.] A flat gingival wall becomes a seat according to its internal formation, and together with the axial walls; a curved cervical wall becomes a seat according to its internal formation and together with the axial walls, so that when the axial walls are involved in filling, the plug is secure against rocking. This fact is equally patent whether the base be flat or curved.

[Sec. 22.] Because of the considerable difference in mesio-distal measurement between points at approximal contact and corresponding points at the neck of a bicuspid, when the axial cavity walls are made parallel and join the flat base at an angle, because of the surface slant of this tooth, packing against these walls is made more difficult, while the tendency to "slide off" is increased by the bevel. On the other hand, if the curved gingival margin be made continuous with the axial walls, and conforming to the occluso-gingival surface convergence, the axio-gingival curve is much easier packed against, and the tendency to "slide off" is materially lessened.

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* "Axial" is used to denote the buccal and palatal walls of a cavity.

[Sec. 23.] It has been said that the anchorage must conform to the extent of filling surface exposed to stress. In conformity with this a small approximo-occlusal cavity must be extended on the occlusal surface, forming a step, thereby increasing the surface exposed to stress; therefore increase the surface of anchorage. As cavities of decay present, difficulty in conforming to the above rule will be found, in that when the extent of decay is so slight that ample dentin remains to form a step it is not necessary, and when the extent of decay is such as to make desirable the step, no dentin remains to make it in. By dividing the bond of union between the cusps of the weakest tooth and substituting a malleable material, the danger of splitting is increased.

These three paragraphs refer only to the inner cavity preparation, and as none of these is an argument for or against extension for prevention we will pass them over.

[Sec. 24.] *The area of immunity to decay is that part of the margins of a cavity not decayed.*

One might as well say that the person who has not been vaccinated and has never had the smallpox is immune, or that the fire-proof part of a city is that part not yet burned.

[Sec. 25.] The extension of these cavities to involve the angles—which are surfaces less prone to decay—is based upon the assumption that surfaces not decayed will decay if not cut out at the time of filling; and as assumption is not science, this leaves science in the background and leads into the realm of the problematic.

As careful clinical observation has failed to demonstrate recurrence of decay along cavity margins properly made on the angles of the teeth, but has demonstrated millions of cases where this precaution has not been carried out, the "assumption" is all on the part of the man who is too lazy or too ignorant to extend his margins to those "surfaces less prone to decay."

[Sec. 26.] Evidence to dispute the accuracy of such reasoning is seen where there has been no recurrence of decay around imperfectly packed gold in approximal cavities with their margins in contact. Again do we see it in the uninjured surface of one tooth enveloped by a cavity in its neighbor—a condition most favorable to decalcification—showing either that the sound tooth is less susceptible, or that the forces responsible for decay active on the surface of one tooth had suspended their operation before the other became involved.

The fact that we call attention to a few isolated cases is no evidence for upsetting the overwhelming evidence of hundreds of thousands of cases recorded after careful clinical observation.

Last winter, in Mason City, a man was stabbed seven times, one cut in the abdomen passing through both walls of the stomach, the bones of the pelvis arresting the point of the knife, the wound being filled with a mass of more or less digested food and liquor. The entire medical corps of the City Park Hospital were as pessimistic in regard to the victim's recovery as the followers of G. V. Black are about the future of a tooth in an environment such as spoken of by the essayist. Contrary to all precedent and expectation, the man recovered. Simply because the unexpected happened in this isolated case, would it be well to reason that this was a normal case, and that all similar cases would recover? Because a few cases have been observed where a tooth has not been carious when exposed for a time to faulty environment, would the essayist have us refuse to correct the faulty environment, simply because he did not know the causes that led to the initial decay?

[Sec. 27.] To claim the right to extend an original cavity because other fillings failed in like cavities not so extended is unjustifiable without a knowledge of the other possible contributory causes to such failures.

The above answers paragraph 27 as well.

[Sec. 28.] It is further stated that the lateral extension of these walls is to bring the margins within the path of the excursions of food, so that they may be cleaned by friction in the act of mastication. This, to be complete, would require that some other force or agent be utilized to similarly protect the gingival margin between the axio-cervical angles.

If the essayist knew the rules of extension for prevention, he would not have made this break. It is true that we extend the lingual and buccal walls laterally to bring the margins within the path of the excursions of food, but we extend them gingivally also until the gum septum in the apical space shall cover that margin (see Figs. 1 and 2), and we have an absolute certainty that any margin so covered with healthy gum tissue will never decay. If the margins are left as in Figs. 3 and 4 recurrence will take place if the patient lives. There is no more susceptible area than E E and F F. This is one of the articles of faith of the Black followers.

FIG. 1.

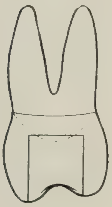


FIG. 2.

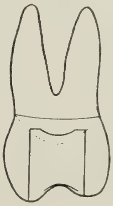


FIG. 3.

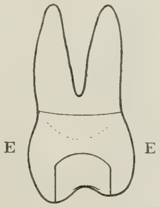
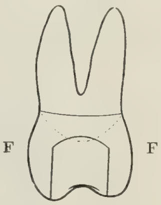


FIG. 4.



[Sec. 29.] Curved margins are more graceful than angles. Curved walls are more conservative of strength than angles. Shallow grooves are more conservative of structure than are angles.

[Sec. 30.] There is greater danger of impairment of pulp function with the angular type of cavity preparation.

These sections—29, 30—refer to internal cavity preparation and have nothing to do with extension for prevention, though we may take them up later under a different heading.

[Sec. 31.] *The character lines on which a cavity is prepared, and the skill with which gold is inserted, are the least of the factors preventing recurrent decay.*

If by "character lines" the essayist means the outline of the cavity margins, he is only making an assertion without a particle of evidence to back it with, and coupled with the next clause, the statement is too silly to waste any time on. One might as well say that the lines on which an architect constructs his work and the skill with which the work is executed have nothing to do with its permanence.

[Sec. 32.] In a work by Robert Arthur, Philadelphia, 1871, recommending the simple removal of the carious area and polishing the remaining exposed surfaces, without other treatment, the author is most positive that by this method he could stay the progress of caries. He quotes a letter from Dr. W. H. H. Thackston, stating in part: "I frequently meet with pearly soft teeth that I filed freely twenty and twenty-five years ago, sound and good, with texture hardened by time and the change that occurs in all dental and osseous tissue as we advance in age; with surfaces shining and lustrous as if some natural polishing forces had been going on in the mouth during the interval. On the other hand, I have to deplore the comparative failure of some of the most perfect and beautiful fillings that cost me hours and days of patient, painstaking labor. . . . Dr. Eleazar Parmly of New York paid one such of my cases the compliment of saying it presented the most perfect specimens of proximate filling he had ever seen. And yet, although the patient was an attentive and appreciative one, who was fully instructed and spared no pains in the care of her teeth, decay, after a few years, commenced around the edges of the fillings.

[Sec. 33.] In the paper by Dr. Miller, before referred to (*International Dental Journal*, vol. xxiv, page 650), we read: "In the second case [there illustrated] we have a lower molar in which the enamel has been completely destroyed by decay and the dentin decalcified nearly or quite to the pulp.

The caries, for some reason, stopped at this stage and the decalcified dentin became hard and black. In other words, it is a case of self-healing of the dentin. Strangely enough, we find a self-reparative process going on in the pulp at the same time.

The two foregoing sections have nothing to do with extension for prevention.

[Sec. 34.] *Three general clinical factors governing in diagnosing conditions of caries, with relation to treatment, in the average patient between childhood and puberty are:*

(1) The general nutritional state.

(2) (a) Commencing period of decay; (b) active period of decay; (c) declining or past period of decay.

It is well to consider these factors and others as well, including the possibility of recurrence of susceptibility in persons who for some time have been immune.

[Sec. 35.] (3) State of suspension of activity of elements responsible for decay, as indicated by changed appearance in tooth structure.

The following are cases from practice as treated in conformity with, and in disregard to, the above plan:

Case I. A girl, age fourteen, with good general health and mental and physical attributes of complete puberty. A period of decay was regarded as passed, there being a number of occlusal and approximo-occlusal cavities, several of such extent of caries as to require both gutta-percha and cement intermediates. All cavities were filled with gold. All teeth were present and vital. After six years no other work has been done.

[Sec. 36.] *Case II.* A first cousin of case I; age twelve, with good general health and the mental and physical signs of girlhood. Here was a commencing period of decay. All of a number of small cavities were filled with gutta-percha. During a period of seven years the work has consisted in the occasional renewal of the gutta-percha without extension of the original cavities, and the occasional filling of a new cavity. (All these cavities will be filled with gold, not inlays, at the proper time.)

Case III. This is an exception to the general rule, the case being that of a married woman of poor nutritional state who apparently has never been free from susceptibility to caries. Nearly all the molars were lost, and only the roots of five of the upper front teeth remained when the writer was consulted. One upper bicuspid was conspicuous among all the remaining teeth as having the appearance of a superior organic matrix. The mesio-occlusal cavity was filled with gold, which is unchanged after six years. All the other teeth have been treated palliatively, except the anterior roots, which were crowned. No teeth have been lost, no pulps destroyed, nor has any change taken place during this period, indicating metal fillings.

Case IV. A girl of ten years, with a small occlusal cavity in each of the lower first molars. The conditions were as nearly alike as it is possible to imagine. One was filled with gold, the other with gutta-percha. The cavities were prepared alike. The gold filling failed within two years, owing to recurrent caries; the gutta-percha filling, except for its being a little worn, was intact, as were the cavity margins.

Case V. A girl of fourteen years. Though the patient was not sickly, her nutritional status was not good. She presented the active period of decay. The mesio-occlusal cavity of an upper bicuspid was filled with gold. The filling failed within two years owing to recurrent caries.

These sections say nothing for or against extension for prevention.

[Sec. 37.] It seems to be the rule that most filling for initial decay is done during the period of usually greatest susceptibility before puberty, and that most dental work after that, if the teeth remain, consists in refilling the original cavities after failure of the fillings, or in the necessary removal of these fillings for the treatment of putrescent pulps which died under or were killed by the fillings. The fact that so much work is usually done during this period explains the impression reflected by the laity in the common though significant statement: "My teeth are soft; fillings do not last." It is the character of the treatment which the teeth receive during this period that is chiefly responsible for the death of the pulp and its chain of consequences.

This statement is a strong argument for extension for prevention, as it shows what is likely to occur where extension for prevention is not practiced.

[Sec. 38.] As before stated, as the formation of a cavity or a filling can have no control over agencies external to the tooth that are responsible for decay, "extension for prevention" becomes a negative remedy.

This statement has been answered under section 4.

[Sec. 39.] As the character of approach to a simple approximal cavity from the buccal aspect will not permit either of the best possible preparation or the best packing of gold for adequate support to the marginal ridge, it follows that the marginal ridge should be removed; to this end, therefore, from a purely mechanical standpoint, *extension for access only* becomes a definite requirement.

This, like twenty-eight other paragraphs of this alleged onslaught on extension for prevention, has no bearing on extension for prevention.

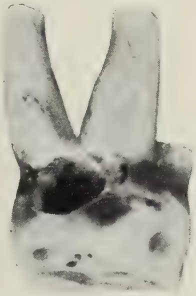
These mighty men of straw—which the essayist builded that he might annihilate them with his alleged anti-extension serum—having been rescued, we will now consider the essay from the standpoint of twentieth-century dentistry. In his zeal the essayist has charged the advocates of extension for prevention with many deeds which neither they nor any other men who are at all progressive ever think of committing. He is also lame in his reasoning from cause to effect.

In sections 7 and 8 he speaks of a "diseased pulp horn isolated by secondary dentin" and "the isolation of an abscessed pulp" in the same way as if the isolation had been accomplished after the parts had been diseased. I cannot believe that the deposit of secondary dentin goes on after there has been an abscess of the pulp. There may have been a slight breaking down of the pericementum in which the pulp was not involved, but when a pulp that has become putrescent resumes normal functions and begins to deposit healthy secondary dentin, then decalcified dentin becomes recalcified.

I will pass around a molar that was removed because of an alveolar abscess on the lingual root. It will be seen that this tooth had suffered from mechanical abrasion as well as from caries, and that the pulp had not "builded a barrier," though no "radical operative procedure had been attempted."

I think the essayist overestimates the recuperative power of the pulp as opposed to rapid caries. Thirty-five years' observation has led me to believe that the pulp pays very little attention to caries until the infiltration of acid begins to irritate it, and then it is quite often too late; but I do believe that mechanical abrasion will stimulate the pulp to throw out secondary dentin, and when the loss of tissue is not too rapid the pulp chamber may be filled with secondary dentin and the usefulness of the tooth prolonged. But often in constricted channels the deposit never reaches the pulp chamber, but occurs in the canals, and these may often be filled to the apex, as is the case in the root shown.

Fig. 5.



Molar in which the root-canals are filled with secondary dentin, while the pulp chamber is not.

We are told that bacteria are ever present and only waiting a lowering of the general health of the patient to start up trouble. An abscess is formed on the root, and when the patient seeks relief in extraction, so the essayist states, we have "a diseased pulp horn isolated by secondary dentin" and a putrescent pulp chamber, also isolated. Do not be misled by the nicely rounded sentences! Dead pulps build no secondary dentin.

It is difficult to comprehend just what the essayist means by the following statement: "Beginning at the time of youth with an approximal cavity backed by a healthy pulp, active in building a protective barrier opposite the point of invasion." The "time of youth" is a very indefinite term, and may cover a period up to ten or more years, and an approximal cavity no doubt means a cavity in the approximal surface of a tooth, but how in the name of reason can a cavity of decay be said to be "backed by a healthy pulp," when in reality it is opposed by that pulp?

Again, in section 9 the essayist says: "Years pass, when the filling is judiciously removed to relieve a putrescent pulp." The removal of a filling made after the Black method in the approximo-occlusal surface of a bicuspid, in order to gain access to a putrescent pulp, is not judicious; it is decidedly injudicious. As well might the surgeon open from thorax to pubes to make a small navel operation. A small hole drilled through filling and tooth in the occlusal surface will afford perfect access to the root-canals of an upper bicuspid, and is a very simple operation. The removal of a filling under such circumstances, for such a purpose, savors too much of the charlatan who seeks to magnify the operation in order to increase the fee.

Again I quote: "A second filling is inserted, but without the step, and the second phase in the retrograde change is recorded." "An accident enters next, and the buccal wall gives way." The most likely thing in the world! If a man bisects a bicuspid and then makes another filling in it without a step and without protecting the cusps, and one or more cusps split off, it is not an accident, it is malpractice, and extension for prevention does not teach such procedure. The Black followers are taught to protect weak cusps from the stress of occlusion, and when a tooth is cut through mesially and distally, as the essayist describes, we are taught to cut off and restore the cusps. He does not need to come West to learn how to protect weak lingual and buccal walls. Dr. M. L. Rhein of New York city has for years made operations for this class of cavities that save the teeth and delight the eyes of those fortunate enough to see them.

FIG. 6.

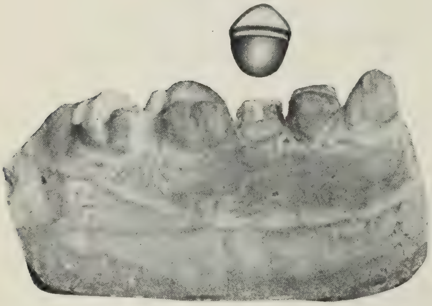
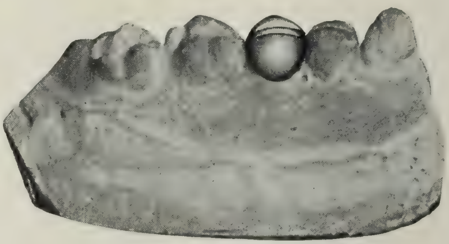


FIG. 7.



An inlay crown. Note improved condition at gingival margin as compared with a shell or Richmond crown.

But we will suppose that the buccal wall has already split off, as the essayist says. Why, then, commit an error worse than those made by all the ignorant operators who have preceded him? Since the introduction of the cast inlay, the shell crown in such a case would certainly not be indicated from an artistic, physiological, or hygienic standpoint.

I submit for your inspection a practical case which I think is not open to many of the objections that apply to the shell crown. (Figs. 6 and 7.) If the essayist wishes to conserve tooth structure and avoid all the evils of which he speaks in the last clause of section 9, why should he not use an inlay like this instead of a shell crown? I might remark in passing that the condition in which I found this tooth was not the result of "radical operative interference" by some philistine of extension for prevention, but was the result of trusting to "a healthy pulp, active in building a protective barrier opposite the point of invasion."

Just what the essayist intended to say in section 10 is not quite clear. It certainly has no bearing on extension for prevention. Let us read what he says, and try to analyze it: "Cases without number are in constant evidence in which gold fillings have been inserted in patients of from twelve to eighteen years with resultant fistulæ appearing later in life, the operation speeding the devitalization, which often would have been delayed had no filling at all been inserted." We will take for granted that the essayist wishes us to understand that gold fillings had been made in cavities in the teeth of patients of from twelve to eighteen years of age, and that alveolar abscesses resulted, but he does not say where the fillings were inserted, nor where the fistulæ appeared, except that it was "later in life," which is a very indefinite location. "The operation speeding the devitalization." Will someone kindly tell us what was devitalized—the pulp of a tooth, the tooth, the alveolar process, the maxilla, or the "patient in whom the fillings were inserted"? This is certainly a deplorable condition of affairs, but as we are left without any specific statement of conditions existing before the fillings were inserted in these patients, and as it is the purpose of the essayist's paper to "discourage radical procedures until the problems involved are better understood," we are unable to draw any useful lesson from the harrowing tale.

Section 16: We do not bevel the enamel margin to assist it in resisting chemical action. We bevel the cavo-surface angle to do away with short enamel rods, and cover the margins with gold to allow the ductility of the gold to protect them from stress by causing the force to be distributed over a larger surface, thus lessening the shock from the cusps of the opposing teeth in the act of mastication. The protecting of brittle margins or edges by the interposition of some softer, more ductile substance between them and the opposing hard substance is not illogical, but is intensely practical. What does the architect do when he sets heavy plate-glass in iron frames or when he sets iron pillars on stone or concrete bases? He puts a layer of sheet lead between the opposing surfaces and makes the weaker protect the stronger. An assistant who has stood at the dental chair six months knows that gold will and does protect properly beveled margins from the stress of occlusion. This kind of beveling or extension, however, is not extension for prevention, but is precautionary extension.

The vamps of my shoes are not exposed to the same sudden impact and grinding stress with the concrete walks as are the soles. You may not be able to see what connection that remark has with extension for prevention. Neither am I able to see the connection between extension for prevention and this sentence of the essayist: "The axial margins of a filled cavity are not exposed to this sudden impact, as may be the occlusal surface." In the first place, there is no such thing as an axial margin, so what does not exist cannot be subject to stress. There is only one axial wall to a cavity, and that wall has no margins subject to stress. The margins that the essayist refers to I should designate as the lingual and buccal margins of the approximal portion of the filling. The axial wall of a cavity is that wall which is next to the pulp parallel with the long axis of the tooth.

It might be well for that good authority on cavity nomenclature Dr. Thos. E. Weeks of Philadelphia to organize a post-graduate class in his city.

Section 19: "Forming the gingival wall on a horizontal plane offers no advantage either as a means for prevention or as a base for the seating of a filling." The essayist is speaking without considering the significance of words. No one has ever contended that the forming of the gingival wall on a flat plane had anything to do with extension for prevention of recurrent caries, but we do insist that it has everything to do with the proper seating of a filling. As well may the architect say that seating the foundation of a building on a horizontal plane offers no advantage.

We will include sections 21 and 22 in this discussion. We will also refer to a few illustrations to better explain the seating of a filling. (See Figs. 8 and 9.) With a base formed like either of those illustrated, a successful architect tells me, stress can be placed until the crushing-point is reached, without tipping, even when the stress is applied to one side of the center, as in Figs. 10 and 11, but if formed as in Fig. 12 it would be exceedingly unstable, and if the stress were applied as in Fig. 13 the lateral walls would have to be very strong or they would split off, as in the case spoken of in section 9. The architect's comment was: “A builder who would place a load on a base like the one in Fig. 12 would be either ignorant or criminal.”

FIG. 8.

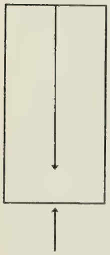


FIG. 9.

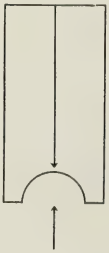


FIG. 10.

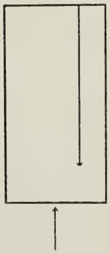


FIG. 11.

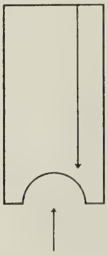


FIG. 12.

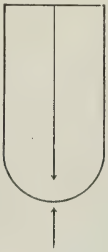
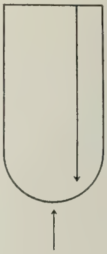


FIG. 13.



Section 21 is such a confused mass of terms that I doubt if the essayist knows what he wishes to have us understand by it. Does he have both a gingival wall and a cervical wall in the same cavity preparation, or two axial walls in one cavity? If he does, I should like to have him explain where he stores them. A filling made in such a cavity preparation as he attempts to describe would indeed be a “plug,” and if he depends on the lingual and buccal walls to carry the occlusal as well as the lateral stress that is exerted on the filling, he will surely have many lingual and buccal walls split off, no one of them being caused by extension for prevention. (See Figs. 1 to 4, page 31.)

Sections 20 and 28 can be answered under one head. The essayist again shows his ignorance of the principles of extension for prevention, or he would not have made such remarks. He is blaming extension for prevention for a condition that extension for prevention will prevent. Extension for prevention teaches us to carry the gingival margin under the gum line, since then there will be no recurrence of decay. Neither the essayist nor any other practitioner ever saw a case of primary caries or of its recurrence under a healthy gum margin. Even that free lance, acid erosion, is impotent under the conditions found beneath healthy gum tissue. Dr. G. V. Black, in answering a question regarding this matter, says:

“It is curious that so many men have misunderstood this point. I am sure that I have always been very careful to state that the gingival margin of a filling, in the proximal surface, should always be under the free margin of the gum tissue. In regard to the micro-organisms which produce the acid that first dissolves the cementing substance from between the enamel rods, you can quote me as stating that these micro-organisms do not live under the free margin of the gum. It is possible that some may be found there, but it is quite certain that if any are located there they do not cause any dissolution of the tooth substance in such a position. You know very well that we do not see decay beginning or progressing on the surface of a tooth under the free margin of the gum. The only way the enamel of this portion of a tooth can be involved in the carious process is for the decay to have first started on the exposed surface of the tooth, penetrated the enamel and into the dentin, and then extended into the dentin laterally under the enamel, thus undermining it; and it may in this way cause decay of the enamel under the gum, but from the dentinal ends of the rods toward the surface (backward decay of the enamel), and the enamel so weakened may break away, and thus the cavity will be extended under the gum."

Again, in section 22, the essayist speaks without thinking in regard to cavity preparation and the packing of gold. The mesio-distal diameter of an upper bicuspid being greater at the point of approximal contact than at the gingival margin makes absolutely no difference in packing the gold, if the cavity preparation is correct. With a flat gingival wall or seat at right angles to the long axis of the tooth (not at right angles with the convexity of the approximal surface of the tooth), with the lingual and buccal walls at right angles to the gingival wall and parallel to each other, and the axial wall parallel with the long axis of the tooth, which will bring it at right angles to the gingival, lingual, and buccal walls —by this preparation a square box is obtained with flat bottom and with every part of the cavity in plain view of the operator.

We will not speak of the step preparation in the occlusal surface, because that does not enter into the question now under consideration. The enamel margin is slightly beveled, to remove all short enamel rods or ragged edges, and any practitioner with the slightest operative skill may pack gold into this cavity without the danger of its "sliding off." There is nothing for it to slide off from, and it makes absolutely no difference whether the cavity is in the mesial or distal surface of the tooth.

From the essayist's words we might be led to think that he supposed the axial wall to be curved with the convexity of the tooth (as in Fig. 14) compelling the operator to pack gold around a corner to gain access to the axio-gingival angle. He speaks of the "axio-gingival curve" as being much easier to pack gold against, and in section 29 says, "Curved walls are more conservative of strength than angles." Fig. 15 shows a cavity with a curved axio-gingival line, and Fig. 16 one in which the axial and gingival walls unite at right angles. I submit to you, Which will be more likely to slide off?—which is the easier to pack gold against? I will admit that Fig. 16 looks ugly and angular, while Fig. 15, with its graceful —ogee, carpenters would call it—curved lines illustrates a thing of beauty, but would not the cavity in Fig. 16, with the gold perfectly condensed into the cavity angles, be more likely to be a joy forever as a seat for a filling that is to withstand stress? A seat made as in Fig. 16 does not expose the lingual and buccal walls to the lateral strain to keep the filling from rocking, as would the cavity in Fig. 15. Retention is largely a matter of resistance form, and certainly the cavity in Fig. 15 will not resist stress without deep pits, grooves, or undercuts, and by these the pulp is exposed to greater thermal shock—for it requires more and deeper retention pits to retain a filling in a cavity shaped like that in Fig. 15 than in one like that in Fig. 16, and as far as thermal shock is concerned, a cavity is no shallower than its deepest pit.

FIG. 14.

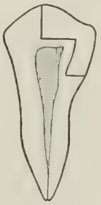


FIG. 15.

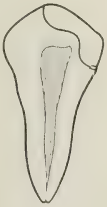
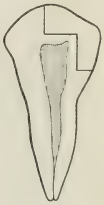


FIG. 16.



I fail to see wherein the five cases cited, as showing patients and test cases with which to prove that extension for prevention is a failure, have any bearing on the subject at issue. There is no evidence to show that any of the fillings were made under extension for prevention rules. The fact that one patient was first cousin to another proves nothing, as heredity is not a factor in caries of the teeth; neither does the statement that "All these cavities will be filled with gold, not inlays, at the proper time," cause any disintegration of the foundation upon which extension for prevention is builded. Nor does the fact that someone made a filling in a cavity in the occlusal surface of a lower first molar of a ten-year-old child, which failed within two years, shatter the superstructure of extension for prevention. There is no evidence to show that the rule for preparing cavities in occlusal surfaces, "including all the imperfections that may be found in the developmental grooves in this surface," was followed, nor that the enamel margins—and especially the mesio-occlusal one—were properly beveled. In fact, we have reason to suspect that these precautions were neglected, because the essayist does not believe in extension for prevention nor in beveling margins.

I have seen three distinct and separate fillings made by an anti-extension-for-prevention operator in the occlusal surface of a lower molar, all connected by imperfect developmental grooves. Is it any wonder that the saying is common in the section of the country in which this method of operating is taught, that the average life of a gold filling is about two years? With all the sins of omission and commission charged up against the disciples of extension for prevention, I can truthfully assert that their operations last longer than that.

It seems to me that there should be a statute of limitations to protect an operator from the consequences of his mistakes so that, after a lapse of fifty years, his sins of ignorance be "remembered against him no more forever."

Of all the atrocities ever practiced under the name of dentistry, the practice of filing V-shaped spaces in the approximating surfaces of human teeth was the climax. Space does not admit of my giving a thorough description of that method. I will show a cast illustrating this method of removal and prevention as shown in Harris' "Principles and Practice of Dentistry," published before the majority of the members present were born. (See Figs. 17 and 18.) In the earlier years of my practice victims of this outrage occasionally drifted West, and we were called upon to remove masses of stringy food that had become impacted in food pockets in the subgingival space. In the act of mastication food would pack into these V-shaped spaces between the teeth so tightly that the teeth would separate slightly, allowing the food to be forced into the subgingival space, where it would decompose and cause decay in the concavity of the teeth.

I am surprised that any practitioner

Fig. 17.

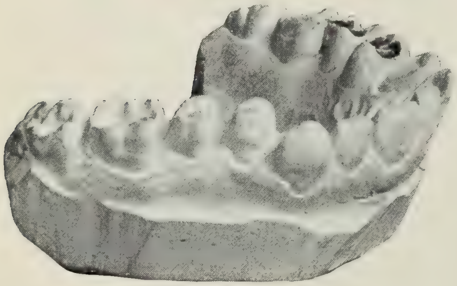
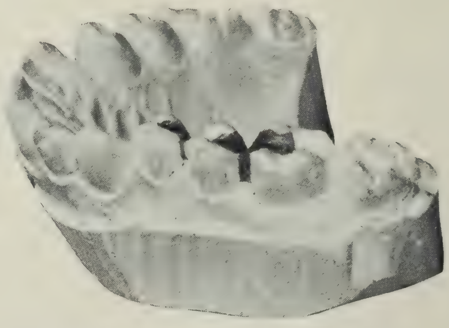


Fig. 18.



Method of filing V-shaped spaces between the teeth spoken of in paragraph 32.

in this twentieth century should want to follow another practitioner, though he hail from Philadelphia, back to the methods practiced in 1845. Such progressiveness as this reminds me of the Chinese. A son of mine is holding the chair of mathematics in a university in the province of Chi-li, North China, this being one of the universities founded before the Christian era. There is a constant strife between the old stand-pat directors and the progressive element. Whenever the latter wish to inaugurate any modern innovations, they are met by the old stock objection and argument: "These conditions have obtained since the Romans invaded Britain; why should we change them?"

Though I come from a progressive state and am heartily in sympathy with the sentiment of my state, I have due respect for conservatism, but not that conservatism that is inanition. Is it not possible that opponents of extension for prevention could learn some lessons in conservatism from these followers of Confucius? And, while they are looking that way, shall we not, as progressive, thinking men and students, look ahead instead of to the traditions of the past for light to guide us in our efforts to save the human teeth?

PYORRHEA AND PROPHYLAXIS.

By F. H. SKINNER, D.D.S., Chicago, Ill.

(Read before the Dental Society of the State of New York, at its annual meeting, Albany, May 4, 1911.)

So much has been written on the subject of oral hygiene, prophylaxis, etc., that it seems as if there were little more to be said thereon. It is not the writer's aim to encompass the whole subject of oral hygiene, which would comprise cleanliness of the nasal passage and sinuses, tonsils, throat, as well as the correction of all irregular and pathological conditions of the mouth and teeth. It is well within our province, however, to be able to diagnose by a glance at one of our younger patients whether he is suffering from adenoids, diseased tonsils, etc., and to refer him to an oral surgeon for the correction of these conditions.

Our field covers the teeth and the mouth, and the object of this paper is to suggest the necessity of impressing upon our patients the need of absolute cleanliness and the methods of maintaining it. This is especially important with our younger patients, as well as with those who have them in their charge.

The following suggestions have proved to be very successful with those practitioners who have given them a thorough trial. Very few are original; they represent rather a medley of ideas applied in my own practice, and gained from reading and discussing with others working in the same field.

THE INITIAL CAUSES OF CARIES AND PYORRHEA ALVEOLARIS.

The exact processes of pyorrhea or of caries have never been fully explained so that the detailed results of one practitioner's work are not disputed by another standing equally high in the profession, but it is probably universally agreed that neither pyorrhea nor caries is found if the tooth surfaces have always been kept clean; that all caries is the result of by-products of bacteria thriving in particles of food that have become lodged on the teeth in places where nature has left a defect in development, or on surfaces favorable to the lodgment of food where attrition and the combined action of the tongue, the cheeks, and the lips do not remove it; and lastly, that the débris so lodged is acted upon by acid-producing bacteria. One of the first processes to take place is the formation of gelatinoid plaques or scales, which are so arranged as to bind a destructive mass in proximity to the surfaces of the teeth so that it is removed only by friction, and if it is of long standing, or is attached to a surface which has already become etched from previous attacks, it requires something more than the friction of a tooth-brush to remove it.

These deposits usually gather just gingivally to the contact point, around the cervical margins, or in the fissure or in depressions of malformed teeth. If sulfocyanate of potassium, or possibly other allied salts, be present in the saliva these gelatinoid plaques do not form, and such a fortunate individual is immune to caries until a change occurs in the oral fluid.

If, as the débris gathers, there is a sufficient quantity of calcium salt to neutralize any quantity of acid formed, no caries will set in, but a crust will gradually form around the necks of the teeth, and increase in the direction of the root, which, if not removed, will finally produce pyorrhea. It is generally observed that when calcium salts gather in abundance no caries is present, and when caries progresses rapidly, calcium salts are absent. The rougher the surfaces of the teeth, the more difficult it is to remove any foreign substance.

It is the essayist's belief that the foundation for a great deal of dental trouble is laid in childhood. During the period of growth it is difficult to induce children to take proper care of their teeth; soft accumulations are left to ferment, and if cavities are not actually formed, the victim enters maturity with the cervical enamel margins roughened and etched. The foundation for trouble is laid before the patient begins to have personal pride enough to care for appearances, or to realize the value of a good set of teeth. About this time the calcium salts which have been used to build up bone tissue are not needed in such large quantity by the system, and are thrown out in the process of elimination. The saliva absorbs its share of these salts, and as it comes in contact with free ammonia, which is always present in the alimentary canal, especially if faulty metabolism or intestinal indigestion be present—the calcium salts precipitate and lodge on the nearest hard substance with which they come in contact, usually the teeth, this process going on continually. The catastrophe of dentistry is that a great deal of harm is usually done before patients realize that there is even any danger.

PYORRHEA ALVEOLARIS.

A few weeks ago I asked a specialist in stomach and intestinal indigestion what percentage of troubles in his specialty were caused by pyorrhea and what number of his patients were suffering therefrom. He said if I would reverse the first part of my question he would say that about 95 per cent. of pyorrhea is caused by faulty metabolism and toxemia, and that fully 80 per cent. of his patients had pyorrhea. I differ with him, although recent experiments by Dr. Black seem to strengthen his argument considerably. Dr. Black claims that by improper or excessive eating he is able to produce calcium salt formation in from six to twelve hours, or that he can prevent it entirely and for an indefinite length of time by proper mastication and diet. In your essayist's opinion, two conditions must always be present to cause pyorrhea. First, the tissue surrounding the teeth must be susceptible to a breaking-down or suppurative process; secondly, there must be a local irritant to abrade the surfaces of the mucous membrane so that infection will take place. In other words, all pyorrhea is of traumatic or infectious origin, and usually both. The following are some of the most common causes: Malocclusion, improper contact points with food impinging upon the gums, ill-fitting bands, any forms of partial dentures which are wholly dependent upon the gums for support or resistance to the opposite occluding teeth, fillings improperly finished at the cervical margins, irregularity, lacerating the tissue with toothpicks in interproximal spaces, a mass of decomposing food, calcium salt deposits, even the minute particles of calculus described by Dr. J. D. Patterson as cactus points—all these will produce inflammation, followed by suppuration, and once suppuration is started, calcium salt deposits develop more rapidly and increase in the direction of the root. Of pyorrhea cases, 75 per cent. are caused, in all probability, by calcium salt deposits which have not been thoroughly removed from under the free margin of the gums when the teeth were being "cleaned," so called.

DRY PYORRHEA.

Too severe brushing or cemental caries will cause death of the pericementum, the latter most likely by way of infection. Pyorrhea as produced by such conditions is the only form of this disease in which no calcium salt deposit is found.

My time is too limited to elaborate upon the many deteriorating effects of this unwholesome disease on the human system, but I will give just one illustration from my own practice. Two years ago I was called to a house, with instructions to be extremely careful in my pro cedures and to do only what was absolutely necessary, as the patient had been in bed about three months, and was in an extremely nervous and weakened condition. Upon looking into her mouth, I immediately saw pus exuding from the gums around the necks of all the teeth. I called the nurse's attention to this, and showed her how by gentle pressure on the gum a drop of pus could be pressed out from the tissue around any tooth I selected. I inserted two cement fillings, which required about thirty minutes, then again pressed the gums around the teeth, and was able to produce another drop of pus from every one. The nurse called me aside and asked if I didn't think that this oral condition had something to do with the intestinal infection, which seemed to be the only cause preventing the patient's recovery, and for which the attending physician had been unable to account. He seemed to think that if this intestinal infection could be remedied, the patient would gain at once. The nurse told him of the condition of the teeth and gums. The next day I received a message to be as careful as possible, but to arrest the flow of pus. It required several sittings to go over all the teeth. In the meantime the patient used a mouth-wash every thirty minutes, so as to prevent the flow of pus into the stomach as much as possible. Three days after I had finished treatment, the patient was able to take dinner with her family, and subsequently her improvement was steady and rapid.

I do not know just to what extent the amount of pus swallowed was responsible for this patient's illness, but if the tissues around each one of the thirty teeth present exuded one drop of pus every thirty minutes, the patient in twenty-four hours would have swallowed three ounces of pus. Even if only one and one-half ounces of pus were swallowed every day, conclusions can readily be deduced as to the effects on an already debilitated constitution.

TREATMENT.

So far, no known systemic treatment has been efficient in arresting this suppurative process, but the complete removal of the local irritant followed by prophylactic treatment invariably produces satisfactory results.

Any set of instruments with which all deposits, as well as dead pericementum, can be removed, leaving a smooth surface, can be used in curing pyorrhea, providing there is no bone complication or absorption of the root and all other irritants are removed. (I have never seen a tooth which was extracted on account of a pyorrheal condition which did not show upon minute and careful examination some local cause for the continued irritation.) The set designed by C. M. Carr has proved the most satisfactory in the essayist's hands. This set of instruments is designed so that every portion of any normally shaped tooth can be reached and planed, with the exception of the sharp angle formed by bifurcating roots, where an instrument of the Younger type is indicated. The point of the Carr instrument is so shaped that accurate results are obtained, with less pain to the patient than was caused by the instruments heretofore used. Should the tissues be hypersensitive, a drop of "Acestoria" acts as an anesthetic as well as a mild antiseptic. Of course, if the pockets are deep, they should be kept clean until new periosteum and cancellous bone have formed—if the pockets show a tendency to fill—or until the gums have receded down to a good attachment. This may require from a few days to a year or so. The tissues frequently are benefited by stimulating with lactic acid, the iodin preparations, phenol-sulfonic acid, bifluorid of ammonia—Head's tartar solvent—or zinc chlorid, etc., but getting the teeth clean and smooth and maintaining cleanliness is the procedure most necessary to cure this curse of the human race. After the tooth has been thoroughly scaled, smoothed, and polished, far more important than medication is the following up, at successive sittings, of the polishing of the tooth to the very bottom of the pocket. If a pyorrhea pocket does not heal up, it is because the tooth had not been thoroughly planed or scaled, smoothed, and polished, or cleanliness has not been maintained, and a reinfection has taken place.

Attention should be called again to the benefit derived from polishing the tooth surface clear to the bottom of the pocket, if possible, at the first sitting as well as at subsequent treatments, which should be administered every three or four days until the pocket is entirely healed. A very fine wood point, such as a toothpick, held in a suitably shaped polisher makes an ideal instrument for this work. The medicinal properties of a freshly made solution of

Iodin crystals,	10 gr.	
Potassium iodid,	1 gr.	
Glycerin,	4 dr.	M.

to moisten the point on which the pumice is carried is very beneficial to the tissues in polishing these pockets, but this solution must be fresh, as it loses its penetrating properties when much over three days old. Of course all pumice must be rinsed from the pocket. If a pocket is deep enough or so shaped as to retain it, Beck's bismuth paste is a very good dressing. It keeps out all débris and is very healing to the tissues. It may be claimed that this polishing will break up healthy granulations, but it will not impede the process of healing nearly as much as if the infectious matter is allowed to remain.

Any normally shaped tooth can be saved if the pocket has not extended beyond the apex, if root absorption has not commenced, and if at least one-third of the original attachment is intact. It is usually advisable to extract teeth that have much up-and-down motion, although a great many seemingly unsavable teeth can be saved by curing the disease and splinting properly. If one or two roots be entirely detached or unsavable they should be excised, and a good root or roots be utilized for crown or bridge work. Roots that cannot be cured should be removed.

PROPHYLAXIS.

Prophylaxis, to be ideal, should start with the eruption of the deciduous teeth. In addition to an occasional visit of children to the dentist, mothers or nurses should be taught how to use a polisher and ribbon floss, and to watch for and remove all the foreign substances sure to gather on the teeth of most children. Children of six, seven, or eight years of age frequently become so interested in and educated to clean tooth surfaces that they detect foreign substances on their own teeth, and learn to handle a polisher as well as a brush with considerable ability. As the permanent teeth erupt, the fissures of molars and bicuspids should be covered with cement, and kept protected until maturity, or longer if necessary. A cotton roll is placed on each side of the tooth to be covered. The mother, nurse, or an assistant is requested to help hold these in place, then, after drying the tooth with compressed air or a chip-blower, it is wiped with alcohol and dried again. The cement is mixed to about the consistence used in crown and bridge work, and the occlusal surfaces are covered with the material, which is pressed to place with the thumb or any finger, well vaselined, thereby preventing the cement from sticking to the finger. The pressure applied should squeeze out every particle of cement except that which is held in the fissures. It will then interfere in no way with the interlocking of the cusps or the articulation, but will prevent caries in the fissures in which it sticks. The copper cements probably have more adhesive property than the lighter-hued ones, but are somewhat objectionable on account of their color. The deeper the fissure the more it is liable to caries, but the sooner the cement is applied, the longer it will last in the fissure. These fissure fillings may require renewing from every two to five years, but they will surely prevent caries of fissures, which is three-fourths of the battle in juvenile patients.

Patients should be subjected to thorough prophylactic treatment by a skilled hand for from every one to three months, according to the care they are able to give their own teeth. By prophylaxis I mean the removal of all foreign substances and polishing by hand. At least two properly shaped points are necessary in all cases. One broad flat point between three and four millimeters in width at the end, for polishing, and preferably concave on one side and convex on the other, is used for the buccal and lingual surfaces of the teeth. A No. 12 gage shoe-peg, sharpened or made very thin to go as far as possible into the interproximal spaces, makes a very serviceable point for the second polishing. Then an iodin disclosing solution is applied, composed of—

Iodin crystals,	50 gr.	
Potassium iodid,	15 gr.	
Zinc iodid,	15 gr.	
Glycerin,	4 dr.	
Water,	4 dr.	M.

Put up in a glass-stoppered bottle.
Sig.—Disclosing solution.

The teeth are stained with this solution and polished until it will disclose no more foreign substances. A dental engine polisher does the hardest polishing where it is least needed, and every time a revolving rubber cup or brush wheel touches the gum it cuts, making a scar; cicatricial tissue contracts. In other words, recession of the gums is frequently caused by careless dental engine polishing as well as by improper handling of a tooth-brush.

By ideal prophylaxis treatment we should be able to bring a child to manhood or womanhood with a comparatively sound set of teeth, very small fillings, if any, and well educated as to how a clean set of teeth feels.

INSTRUCTIONS TO PATIENTS.

When a new patient presents himself, if he be not suffering pain, he should be instructed as to the presence of deposits on his teeth. This can be done by painting the surfaces of the teeth with the disclosing solution. This will not stain the tooth surfaces at all, but only the débris lodged thereon. The patient is given a hand mirror and shown how much accumulation of deposits there is on even apparently clean teeth. It is suggested to him that if as much infectious and decaying matter were allowed to remain on one portion of his hand for weeks and weeks as is allowed to remain on the teeth, he would be very much surprised if the tissue surrounding such a mass did not become inflamed and hypersensitive, as is often the case with the tissues surrounding the teeth. While the deposits are being removed, and the rough surfaces planed or filled and polished smoothly, it is explained to the patient that the enamel of teeth consists of from 95 to 98 per cent. calcium salts (see Tomes' "Dental Anatomy," page 14); that caries is merely a chemical reaction between an alkali—the enamel—and acids—the result of fermentation—just as much as the rusting of a piece of steel is a chemical reaction, and is just as preventable by polishing; that starches are converted into sugars and sugars into acids, and that all damage takes place under plaques—scales—*and only under plaques;* that free acid in the saliva does not destroy the enamel, but that no mouth-wash can reach the acids under these plaques, and that no amount of brushing seems to entirely remove them, but that frequently improper brushing does a great deal of injury to the gums and tooth surfaces. The patient should also be instructed in the proper way of handling a brush. The essayist's plan is always to begin brushing on the grinding surfaces of the posterior teeth with a backward-and-forward motion, keeping the bristles pointed in the direction of the roots, rotating the brush from side to side so that the bristles are felt on the gums on both the lingual and buccal surfaces; by this procedure the fissures are cleaned. Then the brush is placed well up on the gums and with a rolling motion moved toward the occlusal surface, *i.e.* up on the lower and down on the upper teeth, on both the lingual and buccal surfaces. When brushing the lingual surfaces of lower molars, the tongue should be drawn well back so as to expose those surfaces of the teeth to the brush. I usually recommend rather small brushes of medium texture. The smaller adult Rolling brush, medium, will meet the requirements in the majority of cases, and a much smaller brush should be used on lingual surfaces of anterior teeth—for a large one bridges over the inside of the arch. Enough brushes should be kept on hand all the time, so that each brush is used only once in twenty-four hours, and the teeth and gums should be brushed after each meal. Still, the tooth-brush, at best, is a very poor instrument with which to get the surfaces of the teeth clean, and if improperly handled does more harm than good. Cutter's ribbon floss should be used to polish the approximal surfaces once each day. Care should be taken when passing this floss between the contact points, not to allow it to snap into the gum tissue.

This procedure, with periodical visits to the dentist, will keep the teeth esthetically clean, but we want more (the staining solution will show how much more)—namely, prevention of caries. For five or six years I have been giving my patients orange-wood sticks and suitably shaped instruments of the type of porte-polishers to carry wooden points with which to polish off the débris which the tooth-brush leaves, and 75 per cent. of my patients have become quite proficient in the use of these accessories. Some patients are very awkward when they first try to use a polisher, but what child is not awkward in his first attempt to use a tooth-brush? It is only by repeated and persistent instructions and demonstrations that the majority of patients arrive at any degree of proficiency with either a brush or a polisher. Any person is awkward the first time he tries to use a pen, but persistent practice makes perfect. I frequently use this illustration in instructing patients.

Patients are provided with the formula for the disclosing solution, a mouth-mirror, a polisher, and a small bottle of Buffalo flour of pumice. After a few months, as all rough places are polished down to a shining surface, I give them XXX silex, which is amorphous and therefore even less wearing than the crystals of pumice, and later I recommend a tooth-powder composed of—

Precipitated chalk,	6 oz.
Flour of sulfur,	1 oz.
Oil gaultheria or cassia	
	q.s. to flavor. M.

Sig.—Tooth-powder.

Even rubbing with the wood points alone takes off débris that the brush fails to remove. Sodium bicarbonate used on the polisher is also very effective after the tooth surfaces have been made smooth.

The argument may be raised that patients will do damage in this way. A freshly extracted tooth can be cut considerably with a brush and precipitated chalk in thirty minutes of vigorous cross brushing, whereas three hours of rubbing with the same material on a wooden point makes no impression except to produce a beautifully polished surface. The only explanation I can give for this phenomenon is that the bristles of a brush are so hard that the whole crystal of grit embeds itself into the tooth, whereas the wood is so soft that the grit embeds itself in the wood, leaving just enough of it exposed to produce a polish.

In a few instances where patients have been abroad or for various causes knew they would be unable to present for regular prophylaxis treatment, in addition to the polisher, tape, etc., I have given them a scaler or two, and upon their return after six months or a year have been surprised to find their mouths in good condition, with practically no deposits, either soft or calcic, although previous to this *régime* of cleanliness deposits had gathered very rapidly. I mention this to show how thorough an intelligent person can be when given proper instructions.

By this care in quite a number of patients whose mouths were hypersensitive and whose teeth were decaying rapidly when this *régime* of clean surfaces was commenced, no new cavity has developed in six or seven years; their mouths are healthy, not one sensitive place in them, and of course, if care enough is taken to prevent caries, pyorrhea is an unknown quantity.

PROPHYLAXIS DURING PREGNANCY.

There is no time when prophylaxis is indicated more especially than in pregnancy. The bodily resistance of the prospective mother is greatly reduced, and unless proper care is applied, caries progresses very rapidly. The salts which should be thrown out to protect the teeth go to make up bone and tissue for the coming child. The attending physician should recommend a visit to the dentist for the purpose of prophylaxis as soon as the patient's condition has been diagnosed. There should be a prophylaxis treatment every month. If the patient is not able to come to the dentist's office, she should have professional prophylaxis treatment at home, and as soon as she is able to go out, one of her first visits should be made to the dentist. Prophylaxis should be kept up once a month until the child is weaned and the mother returns to her normal healthy condition. The old saying of "A tooth for a child" should be proved a fallacy. Whenever I have been able to control these patients they have passed this trying period without even a decalcified spot forming on any of their teeth.

Unfortunately we cannot always practice ideal prophylaxis, but are obliged to take cases as they are presented to us. If the patient is not suffering pain, the first measure is to clean the teeth. This not only arrests the process of destruction and puts the mouth in a condition more pleasant for treatment, but it allows us to make suggestions which should be very beneficial to the patient. If it is possible to get only one, two, or three teeth clean in the first hour's sitting, this should be done well; one surface is scaled, smoothed, and polished until it is finished, before work is started in another place. The patient is taught how to use the iodin disclosing solution, a polisher and ribbon floss, and it is impressed upon him that at the next sitting the disclosing solution should leave no stain in any portion of the teeth that have been gone over at the present sitting; that at the next sitting as many more teeth will be cleaned as possible, and so on until the entire mouth is put in a healthy condition. Painting the teeth with the iodin disclosing solution once or twice a week will, by virtue of the disinfecting property of the iodin, prevent a great deal of caries and tend to keep the gums hard and healthy, but its principal value lies in locating plaques which are transparent, hence invisible to the naked eye.

Shallow, cervical cavities can be ground, filed, or planed out, and a high polish imparted to the tooth at this point. This may leave some sensitive places, but by using sodium bicarbonate the tenderness can be relieved so that they can be kept clean. Milk of magnesia may be recommended for its acid-neutralizing properties. Painting with deliquescent zinc chlorid does a great deal toward relieving tenderness. I also frequently employ 10 per cent. silver nitrate. This does not stain any except actual carious portions, and greatly retards the progress of destruction. Patients should polish such places every day, as long as they are sensitive, with sodium bicarbonate. Tenderness usually disappears within from one to four weeks.

FEES.

This work should command as high or even a higher fee per hour than we would receive if we were making fillings, inlays, crowns, bridges, or plate work, for we are rendering our patients better service, and a just compensation should be obtained.

MISCELLANEOUS SUGGESTIONS.

All cavities should next be filled. If improperly contoured fillings be present, they should be replaced with properly contoured ones that are carefully finished at the cervical margins. When putting in fillings, the margins should be extended to where they are protected by gum tissue or can be reached easily with the brush, polisher, or ribbon floss, according to the principle of extension for prevention, thereby rendering the cavity margins as well as all surfaces of the teeth immune to caries by the process of absolute cleanliness. In other words, extension for prevention should be practiced, meaning the extension of the immune surfaces.

If bridge work which irritates the tissues, cannot be kept clean, or is improperly occluded, be present, it should be replaced by appliances that meet the ideal requirements. It is impossible to maintain a healthy condition when a partial plate is worn which rests on the gums.

During the first year of prophylaxis treatment the patient should be seen at least once a month. After that, as he learns what a clean, healthy mouth feels like and how it is maintained, the periods for treatments may be extended, but it is not well to let any mouth go unobserved over three months.

One of my patients informed me that she was limiting herself to two meals a day, because it was too much work to use a polisher more than twice daily. I told her that if she went over her mouth twice a week it would be sufficient. She replied, "Oh, but my mouth feels so uncomfortable until I have used the polisher and ribbon floss." Needless to say she has not had a new cavity in several years, and barring accident or sickness, she will keep her teeth until she reaches the allotted threescore and ten.

Every dental school should have a chair of pyorrhea and prophylaxis. The head of this department should be chosen as carefully as the professor of operative dentistry. These two departments should be on the best of terms and work in harmony, *i.e.* fillings, crowns, bridges, etc., should be constructed so that they can be kept clean.

Students who have entered a dental college should have a careful examination made of their oral condition, records should be kept, and if these students are not giving their own mouths proper care, instructions should be given them. Examinations should be held periodically and their grading should partly depend upon this examination. In this way every graduate would know from experience the sensation of a clean, healthy mouth, for unless a man really knows and believes what he is advocating, his arguments lack force when he goes into practice and tries to instruct his patients.

Any student who lacks the ability or does not take pride enough in his own mouth or his chosen profession to practice preventive dentistry on himself should not be graduated.

By these measures we shall render to our patients better service in preventing caries and pyorrhea than by inserting the best filling, crown, bridge, or plate that human hands ever made.

CALCIFICATION.

By R. R. ANDREWS, D.D.S., A.M., Cambridge, Mass.

(Read before the Dental Society of the State of New York, at its annual meeting, May 4, 1911.)

THERE is a serious handicap in studying the formation and calcification of the teeth under the highest powers of the microscope. Living processes at the stage of growth which we desire to study have ceased, and the tissue is dead.

Any section we may study represents only the condition at the time of death of the tissue, and only by comparison of many sections are we justified in drawing definite conclusions. Incidentally we must also allow for post-mortem changes. All this means study, comparison, reflection, and logical deduction.

We have employed as material the jaws of pigs, calves, sheep, and whenever possible those of the human embryo. In all of these the processes of growth are practically the same.

Most of my work on calcification was done during the years from 1885 to 1888.

In 1887, before the American Academy of Dental Science, Boston, the first review of my observations was presented, followed by a demonstration of forming enamel—not, as was then taught, by the calcifying of the enamel-forming cell itself, but by a substance deposited through the cell body to the earliest formed dentin layer, where it afterward calcified. In 1890, before the International Medical Congress at Berlin, I read another paper on this subject, and there demonstrated this same result more clearly, by the first electric projecting lantern, using as slides my own sections, with the late Prof. W. D. Miller at the lantern.

As time goes on, wonderful changes take place in the methods of investigation. Perhaps the most wonderful are those recorded by the workers at the Rockefeller Institute, where it has been found that small pieces of organs, severed from the body and placed in a plasma medium drawn from the animal, can be made to grow, under the investigator's eye, between hollow glass covers, after separation from the original owner. The investigators at that institute have proved that kidneys, glands, marrow, bones and cartilage, and even the skin, will live and grow, under certain conditions, as if still endowed with some of the life principle of their living owner, though severed from him.

At some distant day, perhaps, we may be able to investigate in this way parts of the forming jaw, and study the forming tissue of living enamel organ or dentin germ. What a valuable addition this would be to the present method of research!

THE EARLIEST STAGES OF TOOTH DEVELOPMENT.

I shall be obliged in the following pages to quote parts of former papers in giving a brief description of tooth formation from the earliest stages.

At about the end of the second or the beginning of the third month of intrauterine life, we find in the embryonic tissue of the jaw a primary specialization of cells which are to form the dentin germ. This dentin germ is not formed in any special zone or layer, but seems wholly influenced by the contact of embryonic connective tissue with the earlier formed enamel organ of epithelial origin.

In the presence of this organ the adjacent cells become stimulated and active. They seem to offer a resistance to its further ingrowth, and by this resistance the enamel organ is made to expand, thus becoming flattened and broadened at its base.

The stimulation and activity of the embryonic cells is shown by their rapid growth, which clouds the part at this point, becoming a dense focus of new growth. The tissue is seen to be actively building itself up, and this results in the formation of a papilla, around which the enamel organ is growing like a cap or helmet. The papilla grows to one or several cusps, and becomes the dentin germ.

At the end of the third or the beginning of the fourth month the dentin germ is a rather homogeneous structure. Round cells are very numerous; they have relatively large nuclei and nucleoli. As the germ assumes the cusp shape, multiplication of cells takes place around young bloodvessels which are forming at the base of the germ, and a jelly-like layer has formed around its outer surface. The dentin germ is found to grow into the depressions of the enamel organ of a bicuspid or molar, and these growths become the dentin cusps. We also notice that the different layers of the enamel organ are now formed, and that the sacculus is now forming its layers about both enamel organ and dentin germ; when this process is completed, these are inclosed in a sac, and this is a dental follicle. Within the area of the follicle are contained all of the cells which by multiplication and differentiation develop later into the mature enamel, dentin, cement, and pulp tissue of the fully formed tooth.

The round cells on the rim of the dentin papilla appear to be in a protoplasmic substance, sometimes called a zone of amorphous material. It is a hyalin structure on the outermost surface of the germ. The cells just within become larger, and many fiber-like processes are seen to be forming from them; they are becoming branched cells, and some of the branched processes enter the enamel organ; a little later the cells at the surface of the germ grow larger and assume a columnar shape, which is probably caused by mechanical compression. Some authorities have spoken of elementary cells on the outer layers, from which, they say, the odontoblasts are formed, but I have never observed anything but globular masses, which are not cells. They are found in the protoplasmic substance of the rim mentioned above. At the beginning of the fifth month these cells on the surface are seen to be undergoing a histological differentiation, as stated above, and are then the odontoblasts, consisting of little more than masses of protoplasm with a nucleus. A marked change has taken place within them. Under the microscope these formative cells of the dentin, while forming dentin, will be seen with their ends flat and abrupt against the layer of dentin formed, while, just next to them, within the pulp tissue, the pear-shaped cells are found, sending many processes within the substance of the square and abruptly shaped cells, and also between them.

The dentin-forming and the enamel-forming cells are now strictly specialized, and have a strong affinity for the calcium in the lymph about them. Ehrlich, perhaps the greatest authority on cell activity, has proved that living cells have some specific or elective affinity, an individual taste for some peculiar substance floating in the blood or in the fluids about them. The formative cells of the enamel are lime-seekers in the fullest sense, and as builders of that calcified structure they differ from those about them. They perform this function alone, and then die.

ENAMEL FORMATION.

We know from the experiments of Rainey and Odd that certain soluble salts of calcium, mixed with an organic fluid, blend with that fluid and form a new substance, which is deposited at the base of the glass, first in globular, onion-shaped bodies, these afterward coalescing and forming a layer unlike the lime and unlike the organic fluid; the layer thus formed is similar to the tissue known in histology as "borderland tissue." It is exceedingly difficult to destroy with acids. In beginning calcification in the ameloblast, the upper part of the cell is filling with minute granules supplied by the enamel organ; these appear as minute glistening particles. In that portion of the cell nearest the nucleus we can see that these are changing into minute spheres or globules. As soon as the developing tooth point, by its outward growth, has pushed its way through the substance of the stellate cells of the enamel organ, and has reached the connective tissue, with its blood supply, we shall find that these minute globules are enlarging by merging together. These larger globules are in the lower portion of the enamel cells, and they are largest near the point of calcification, *i.e.* the base of the cell. They are sometimes almost structureless, but occasionally are seen to be made up of many smaller globules. The calcifying process going on in this cell differs from that occurring in other calcifying tissues; we do not know just how, but we do know that the tissue formed has a different chemical combination, and that it forms a material exceedingly rich in calcium salts and of such hardness that it resists the file and strikes fire against steel. Enamel is the hardest tissue formed in the body. As the enamel globules are placed near the point of calcification, they are found to be somewhat larger than the rod which they are to form. By some power they seem to be forced inward against the calcified portion, as if undergoing some sort of compression. Each mass is as yet separate from the next, with the semi-solid cement substance around and between it.

If this young enamel should now be teased away from the layer of ameloblasts, we should see epithelial fibers. They stand out from the section somewhat like the teeth of a comb, but are so covered with the protoplasmic cement substance, which is partially calcified, that it masks them, and it is somewhat difficult to distinguish them as fibers; but they are too regular in their arrangement to be accidental formations caused by the pulling out of calcific matter into the form of plasmic strings. If we examine another section, showing the enamel-forming layer and the formed dentin, we shall find what appear to be fibers spanning any space from the ameloblasts to the formed dentin, in a regular systematic order. I am led to believe that the so-called plasmic strings are simply epithelial fibers with the cement substance of the enamel clinging to them. The formation of these epithelial fibers I have described in a former paper. They appear to originate from the stratum intermedium, and act as a scaffolding, apparently, to support the globular bodies that are forming rods, and the cement substance between the rods. They are of epithelial origin and are formed of long chains of minute globules which afterward blend with each other to form fibers. These fibers calcify with the enamel, and it is sometimes possible to see them as a calcified fiber within the calcified enamel. What little life we find in enamel is due to dentin processes which have grown into it.

When the process of enamel calcification is about to take place, it is found, as has been said, that the connective tissue has come into close proximity with the upper ends of the ameloblasts, a layer of cells of the stratum intermedium being interposed. The external epithelium of the enamel organ and the cells of the stellate reticulum have disappeared from the part. The spindle-shaped cells of the stratum intermedium which remain are by some authors credited with forming a kind of connective tissue and it is said that the ameloblasts at this stage strongly resemble gland cells. These cells form a layer of columns over the already calcifying dental cusp. Enamel forms on the deciduous teeth about the seventeenth week of embryonic life, ending at about the sixth month after birth. On the permanent teeth it begins to form at birth on the cutting edges of the first molar, and ends about the tenth year on the crown of the third molar. As the enamel organ forms over the papilla which is to be the dentin germ, the cells covering the germ, named the internal epithelium of the enamel organ, become the ameloblasts, the enamel builders. They now become a physiological apparatus—a sort of chemical laboratory, if you please. The builders of the calcified enamel have a nucleus, but scarcely any membrane. The power of the cytoplasm of these cells, with its formative activity, creates calcific globules with the calcium from the lymph about them. Thus it will be seen that the special function of these cells is to absorb the calcific material. Within the cells it is elaborated, and then given out first on the calcifying dentin, in an altered form.

FORMATION OF DENTIN.

The enamel rods are thus built up, globule on globule, until the rods are complete. New ameloblasts are formed to supply those necessary to cover the larger circumference of the surface as it forms, and all tissue calcifies, and thus normal enamel is formed. In the formation of dentin the odontoblasts, combining with the calcium from the plasma about them, form the same minute glistening globules which become calco-spherites. These are plainly seen to differ from the cytoplasm of the cell, and are of fixed form and structure within the cell. By the blending of these in the protoplasmic exudate already given out, a layer of borderland tissue is formed. This exudate is playing the part of an intermediary in selecting calco-spherites from its environment. The details of the vascular mechanism by which the building-cells are supplied with calcium necessary to form calcified structure have not as yet been wholly worked out. Capillaries near the building-cells do not communicate directly with the cells, but must supply calcium to the plasma about them. The inorganic calcium which is necessary, manifestly cannot be supplied as such by the organic building-cells, but must make its initial entrance into the body from without. This entrance during the fetal state must necessarily be through the maternal circulation, and after birth it must come from the food which passes through the alimentary canal. From here it must be carried to the special building-cells which superintend the process of calcification. There can be but one such distributer, namely, the blood supply.

After the absorption of food into the circulation by the intestinal epithelium, chemical analysis of the blood shows the presence of two calcium salts, the insoluble phosphate and the soluble carbonate. It can be readily understood that the soluble carbonate can be absorbed, but how the insoluble phosphate can be absorbed is still a mooted question. It is believed, however, that it is absorbed in that same loose chemical combination with proteid in which it is found before absorption in the casein of milk and the yolk of egg. Chemical analysis has shown these two foods to be very rich in calcium. The casein and the caseinogen of cow's milk, according to Bunge, contains more calcium to the liter than does lime-water. Caseinogen, according to Soldner, contains from 1.65 to 2.36 per cent. of calcium. The proportion of calcium in combination with the proteid of egg-yolk has been found to be about the same.

The loose calcium-proteid combination, arriving during its passage through the dental pulp capillaries within the radius of the special physiologic motive force of the odontoblasts, is acted on by this vital force, and thus becomes ingested by the cells. We believe that here it becomes modified by the cytoplasm of the cell, by a chemical combination with its organic substance, and in this way calco-spherites are formed. Within the cells these globules seem to have the property of coalescing, and as they are placed by the cell against the surface to become calcified they are found to be, in many cases, large globular or irregularly shaped masses. These masses, merging with others, smooth out and form the layer always found between organic and calcified tissues where the process of calcification is taking place. This is the layer known to investigators as borderland tissue. Hoppe-Seyler asserts that the lime which hardens dentin and enamel is a double salt of carbonate and phosphate of calcium, combining one equivalent of calcium carbonate with three equivalents of calcium phosphate.

The various processes of dentinification have been demonstrated to me by many hundreds of sections cut from developing teeth at the time when calcification was beginning, and from tissue prepared as near the life of the animal as it could be and prepared with the least possible manipulation consistent with perfect specimens.

To recapitulate: The formation of dentin from the dentin germ proceeds substantially in the following manner: We notice that the hyaline substance on the rim of the germ, which is a protoplasmic exudate that surrounds the outer ends of the formative cells, is filling up with minute, glistening, irregularly shaped masses that appear semisolid, many of them being globular, but all tending to form by fusion a layer of a substance which is involving a portion of the outer ends of the odontoblasts. This layer calcifies, and a dentin matrix is formed, layer after layer, until the dentin is completely calcified. If we are studying the forming dentin we cut our sections at a period of growth covering one of these stages—and in these sections we do not always obtain the same picture. Sometimes the section will show the globular formation stage, sometimes the stage that shows the continuous band of borderland tissue, and sometimes, though rarely, we get a picture that shows no appreciable layer between the odontoblasts and the calcified dentin.

This borderland tissue (calco-globulin) has its birth only after the substances which form it have passed out of the building-cells. It is formed here by a perfect fusion of the calco-spherites with the protoplasmic exudate. It is a transition tissue, which is to become calcified. In it the calcium is held in some sort of a chemical combination not yet understood. It forms the sheaths of Neumann surrounding the dental fiber. It is exceedingly resistant to the action of acids, caustic alkalis, and boiling water. Some authorities claim that no borderland tissue exists in the formation of the dental tissues, while all the evidence tends to show that none of the calcified tissues of the tooth could be formed without it. As I have said, as one layer of this substance calcifies, another forms, and the process continues until the normal dental formation of the tooth is complete.

OBSERVATIONS ON CALCIFICATION IN LIVING CELLS.

A few years ago there appeared in the *Journal of Morphology* an article by Nathan R. Harrington, entitled "The Calciferous Glands of the Earthworm." As that writer studied calcification from living cells of the earthworm, his work is of particular interest here. He says that this type of calcareous forming cell offers particularly valuable opportunities for studying its cellular activities, because each cell is distinctly isolated from adjacent cells, and in each primitive form successive morphological changes may be more readily observed. I wish to call your attention particularly to his description of cell activity, and to ask you to note its similarity to that of the formation of minute globules of lime that we find within the ameloblasts. In his researches he shows how far glandular tissues recuperate after the waste caused by secretion, how the regenerated cell substance is transformed into especially differentiated material, and how these products of secretion become released from the cells. For this investigation his material was well adapted, for the lime-producing cells, in this instance, are almost isolated from each other in the natural state, and the cell activities can thus be easily studied in their various morphological changes. Also, any desired stage in the cell history could be obtained by feeding the worm normally through the soil in which it burrows. Harrington found that stimulation with acid food caused an oversecretion of the glands, and thus the study of the constructive stages in the lime-formation and the resultant degeneration and regeneration were greatly facilitated. He noted that the nuclei of the cells are oval, small, with heavily stained granular chromatin and feebly defined nucleolus. The cytoplasm is dense and composed of elements closely knit together. In a later stage the cytoplasm expands a little about each nucleus, a slight projection is raised up, and as the action proceeds the cytoplasm continues to increase in extent. It becomes less dense, and vacuoles appear here and there, the nucleus becomes decidedly vesicular, the nucleolus large and densely staining. In normal worms this is the height of constructive activity, and the cell is now ready for the changes which will result in the formation of lime globules. There can be no doubt that the secretion occurs in its final form inside the cell before the latter is broken down. Minute round globules appear at the nodes in the reticulum, and almost fill the spaces or alveoli between the loose cytoplasmic network. Sometimes a single shred of the cytoplasmic substance can be seen in the gland cavity, with a few of the globules attached to it. In a cell which has passed the height of constructive metabolism, these round globules may be seen shooting out, as it were, from the nodes of the disintegrating cytoplasm, apparently having grown in much the same way as certain mineral crystals form in a strong organic solution. Harrington further says:

> Although I have very distinctly made out the small globules inside a cell which has not yet broken down, and have seen them dissolved by acid, it is quite impossible to determine whether they are derived from the reticulum, or partly from the cell sap which fills the spaces. . . .
>
> As the small globules accumulate more and more, growing at the expense of the cytoplasm, or causing the latter to fall away, large vacuoles appear in the club-shaped cell projections, and through these the lime globule makes its way into the gland cavity, probably often forced out of the cell by the mechanical contractions of the surrounding tissue. There is very probably an organic matrix surrounding, or permeating, these small globules when they are first formed, otherwise one cannot understand why they should be globular rather than rhomboidal in shape. Moreover, a residue is always left after acid treatment. Nearly all the cytoplasm in the cell is used up in the production of lime globules. Coincident with the appearance of new nuclear elements from the wall of the blood sinus, or from the blood, the constructive process starts up again, and there is a repetition of the lime-forming process.
>
> To summarize: First are observed constructive processes of the cell, during which elements derived from the blood are built up into cytoplasm; next, these elements are transformed, and in them elements of the cytoplasmic reticulum give origin to lime globules; then follows a gradual accumulation of globules inside the cell until the walls are broken and the lime globules, with more or less cytoplasmic reticulum attached, are cast out into the gland cavities. With the rise of another cycle of secretion, a younger generation of nuclei appear nearer the blood sinus. Dilapidated nuclei, formerly active, can still be seen at the distal parts of the cell cytoplasm. One might be tempted to regard the extremely thin layer of cytoplasm as a membrane through which lime in solution passes by osmosis directly from the blood, but no positive evidence can be offered for the proof of this view, while we know that substances from the blood are first connected with this cytoplasm—either the reticulum or the cell lymph—and appear as lime crystals or globules only at the distal ends of the cell, after the cytoplasm has undergone considerable differentiation. Stohr goes so far as to state that the gland cells generally have their secretion appear first in the form of granules, but these calciferous glands form the product within the cell, with absence of granular or thread-like stages in the normal production of lime, and with a disintegration of the nucleus during secretion, after a definite and constant cycle of changes which is correlated with progressive changes in the cytoplasm and a replacement of the nucleus. If the substance of the reticulum from which the lime comes was ever an integral part of the nucleus or in structural connection with it, it must have been during the constructive phase.
>
> There are never granules or threads of any kind discernible which arise from the nucleus. The nuclear and protoplasmic structures resemble each other very closely in their exhausted condition. The disintegration of

the cell during secretion is entirely consistent with two other characters which indicate that the lime-producing cells are very much specialized; there is no membrane bounding their irregular contour, and the cells from which they have descended divide by amitosis.

FORMATION OF CEMENTUM.

The formation of the cementum begins on the neck and root of the dentin. The connective tissue cells of the inner layer of the sacculus become stimulated and active, and as a result osteoblasts are formed. These by blending one with another form scales of irregular shape, which attach themselves to the formed dentin. In this state it resembles borderland tissue, but by its further calcifying forms the thin, transparent, and friable layer at the neck of the tooth. As the cementum becomes thicker, bone corpuscles or osteoblasts are inclosed in the stratified matrix. In the fully formed cementum the processes of the bone corpuscles undoubtedly anastomose with those of the dental periosteum, with each other, and with the processes of the granular layer just within the dentin. I have never found a special organ for the formation of cementum.

I am unable to clearly account for the formation of the horn-like layer misnamed Nasmyth's membrane. It is not a membrane. There is a thin layer formed over the crown of enamel at the time of the eruption of the teeth, but it is so soft that it rapidly wears away. I have demonstrated its existence many times. Tomes thinks it to be a thin layer of cementum formed by the inner layer of the sacculus. We might expect this if the enamel cells calcified in forming enamel, but they do not. This layer seems too soft to be cementum. My own investigation leads me to believe it to be formed by the merging together of the cells of the last layer of ameloblasts with the cells of the stratum intermedium, an imperfect calcification or hornification thus being formed.

(The essayist then demonstrated by means of lantern slides some of the points spoken of.)

MISTAKES, COMMON AND UNCOMMON.

By C. N. JOHNSON, M.A., L.D.S., D.D.S., Chicago, Ill.

(Read before Section II of the National Dental Association, at its annual meeting, Cleveland, Ohio, July 26, 1911.)

AT the outset I wish to subscribe to the acknowledgment that "To err is human," and so I wish it to be understood that in regard to the mistakes to which I call attention, this is not done in a mere spirit of criticism. I am too conscious of the many of which I myself am guilty to have the courage to take to task others who make mistakes. But if we recognize the fact that we are often on the wrong side of a matter, it may help us in solving the problem of getting on the right side—and so it may not be always unavailing to point out our mistakes.

In the practice of a profession the pursuit of which involves so much of a technical nature, and in which techniques are necessarily changing constantly to keep pace with advancing methods, it is not strange that mistakes should occur in the evolution from one method to another. We must have charity for the man who, in groping after better things, must needs stumble and fall many times before he at last reaches solid footing. If men took no chances of mistakes there would be little progress, and yet there comes a time when it is necessary to pause and take stock of our progress, and see if we are not making more errors than necessary.

TAPE, WOODEN POINTS, AND MASSAGE IN POLISHING TEETH.

One of the mistakes which recently has crept into the practice of some dentists consists in poor judgment in the manipulation of tape between teeth in polishing their approximal surfaces during prophylactic treatment. The loading of tape with pumice or other abrasive material and sawing it back and forth in the interproximal spaces produces more harm than good. Aside from unnecessarily lacerating the gum tissue and tearing away the delicate attachment of the pericemental membrane from the circumference of the root, this procedure frequently results in extreme sensitiveness of the necks of the teeth, and brings about a worse condition than the one which it was intended to cure. The extreme to which some operators have gone in this use of tape was probably never conceived of by the man who first suggested oral prophylaxis, and he of all others would be most urgent in calling a halt to such practice.

In passing, it may be said that when smoothing and polishing the surfaces of teeth under the free margins of the gums the delicate and tapered wooden points carried in holders, as suggested by Dr. D. D. Smith, are ample to produce a smooth surface to the tooth, and if carefully used these points may be carried into pockets under the gum without undue laceration or injury. This may require a little longer than the use of tape, but it is better to take extra time during the operation than to be obliged to utilize this time in explaining to the patient why the teeth are so sensitive after treatment.

Gentle massage is beneficial and stimulating to the gums, but they will not tolerate the laceration and abuse frequently inflicted upon them through the careless use of finishing strips in polishing fillings in approximal surfaces. We have frequently been warned against this kind of injury, and now we are practicing the same kind of damage under the guise of oral prophylactic treatment. This mistake should be remedied at once, otherwise our patients will develop a prejudice against prophylaxis on account of the resultant sensitiveness, and will refuse to submit to this treatment even when the indications are imperatively in its favor.

CROWNS AND GUM IRRITATION.

Another mistake, which happens so frequently as to be classed as a most common one, is the practice of cutting off natural teeth and substituting artificial crowns in cases where such a procedure is entirely unnecessary. Many a natural tooth has been sacrificed to this mania for crowning, and much criticism and severe censure has been meted out to the profession for this practice. It has been taken for granted that this practice was due to selfish motives and not to mistaken judgment. In some instances this is probably true, but I prefer to believe that in very many cases the operator honestly thinks that he can make a more permanent operation by crowning than by filling. This fallacy in regard to the longest service of the tooth needs only to be pointed out to be recognized. Granted that the natural crown of a tooth is somewhat extensively decayed, and that a filling operation cannot be expected to last many years, it is safe to say that the condition of the gum around the tooth will be better during the few years that the filling lasts than if a crown had been applied. If a crown must eventually be used, the operator, by first filling the tooth, has gained for his patient the service from the tooth for just the number of years that intervene between the filling and the crowning, because the tooth will ordinarily last as long from the time when it was crowned in the second instance as it would have lasted had it been crowned in the first instance.

The question of gum irritation is becoming a more and more important one as we note the number of teeth that are lost annually by the process of loosening, so much so that a general plea is being made in the profession for a bandless crown wherever it can be employed. It is being recognized quite commonly that bands irritate in most cases, even if they have been carefully fitted, therefore the longer we refrain from applying bands to the teeth, other things being equal, the better chance we have of preserving the gums in a healthy condition. This seems more significant owing to the fact that most cases of needless crowning involve molars and bicuspids, the natural tooth being simply ground down on the sides and a shell gold crown being telescoped over, thus introducing all of the disadvantages of the band, which is frequently far from fitting perfectly.

In the days when large restorations by filling had to be made with gold foil if they were made with gold at all, there was some semblance of justification for crowning for those operators who had little confidence in amalgam, and yet it may unreservedly be stated that a well-made amalgam restoration is far preferable to immediate crowning in many such cases. The advent of the gold inlay, however, has left not the slightest ground for the over-enthusiastic crown worker to stand on. We can make restorations now which would have been ill-advised if made by the gold foil method, and there is absolutely no question as to the promise of better service from a good inlay as compared with a crown.

If we study carefully the tendency of the times in regard to the loss of the human teeth, we note that an increasingly large number of teeth are lost by failure of the surrounding tissues rather than through extensive caries of the teeth themselves; therefore, in justice to our patients, we should aim to keep the tissues healthy. From this point of view it is something more than a mere mistake if we persist in performing operations the nature of which jeopards the integrity of the supporting tissues, while other available operations would be equally effective and devoid of this disadvantage.

CONTACT POINTS.

While speaking about injuries of the gum tissue through faulty operations, another mistake comes to mind which requires special emphasis, although it has been pointed out so frequently that any reference to it at this time would seem unnecessary. Yet the fact that its importance is so generally disregarded renders it desirable to raise the strongest possible objection on every suitable occasion. This mistake consists in faulty contact points on the approximal surfaces of fillings and crowns, which result not merely in immediate discomfort caused by food wedging between the teeth, but in permanent injury to the tissues that fill the interproximal space, and in the creation of pyorrhea pockets which ultimately cause the loss of the teeth. It is not necessary on this occasion to consider the normal form and function of the contact point, but attention should be called as urgently as possible to the grave mistake which many practitioners are making in their daily practice by ignoring this important matter. No one thing connected with the operation of filling teeth, aside from the fundamental essential of arresting the carious process, is of greater consequence to the future serviceability of the tooth than this necessity of establishing and maintaining good contact; and of all the commendable qualities which have been enumerated in favor of the gold inlay, none is of greater consequence than the fact that by its use in cavities involving the approximal surfaces good contact points may be more easily made and maintained than by any other kind of filling operation.

ROOT-CANAL FILLING.

Another mistake to which I wish to refer is like the proverbial two-edged sword; it is the much-mooted question of filling root-canals. I am about to make an unusual plea in connection with this operation. Ever since I have read dental literature I have seen emphasized the direful results of not getting the root-filling to the apex. Skiagraphs have repeatedly been made showing imperfectly filled roots, and the performers of these operations have been held up to scorn for their faulty technique. It is true that much imperfect work has been done in this particular, and it should be our aim to reach the apex of the root as accurately as possible, so that the canal is obliterated and the ingress of bacteria prevented. We should try to seal the apical opening, but this is much more easily said than done, and in the blind attempt to do this in every case it is questionable whether more harm is not being done than good. The vision of the skiagraph before the operator sometimes leads him to injudicious attempts at enlarging the canals and reaching the apex when this is not practicable. Some canals have curves which defy man's ingenuity in negotiating with an instrument, and it is folly to attempt this by any mechanical reaming process.

Reaming. This does not imply that a canal drill is never indicated. Frequently a slight constriction of the canal is found just rootwise of the point at which it leaves the pulp-chamber, and this orifice should in many instances be reamed out to admit of better access to the canal, and to show the direction which it takes, but advancing the drill any distance into the canal means inviting disaster. The use of sulfuric acid as introduced by Dr. Callahan of Cincinnati is probably the safest method ever suggested, and yet there are cases of curvature of the canal where it is impossible to work the acid with a broach. Fortunately for the operator and the patient this curve is usually situated near the apex, where the canal is small, or it is present in roots the canals of which are not large enough to contain much deleterious matter. Otherwise there would be more abscesses following attempts at filling these canals.

Perforation. What I wish to emphasize most strongly is the mistake too frequently made of drilling through the wall of the root in an effort to enlarge the canal, and the projection of the filling material beyond the apex. Painstaking efforts at cleansing all canals are commendable, and, as has been said, we should try faithfully to reach and seal the apex with the filling, but considering the curvature present in most roots and the difficulty of access through carious cavities, it is dangerous to insert a drill or reamer any distance into a canal, as it is also unwise to exert too great pressure in forcing the filling material to place.

FORCING THE ROOT-CANAL FILLING BEYOND THE APEX.

Skiagraphs show other mistakes besides unfilled canals, and copper wires and gutta-percha points projecting beyond the apical ends of roots have too frequently shown the unwise zeal of operators. Even when alveolar abscesses do not occur as a consequence of these projecting root-fillings, usually an irritation is set up that leads to an otherwise unaccountable lameness of the tooth, which would never have occurred if the filling had not been forced beyond the canal. It seems to me injudicious to aim invariably at a certain symptom which has been often cited by operators as a guide to root-filling. We have been taught to force the filling till the patient flinches slightly, which is supposed to be an infallible guide indicating when the filling has reached the apex. This, however, is not a true guide, nor is it a safe symptom. The patient may flinch long before the filling reaches the apex, owing to the condensation of air under the filling, or on the other hand, there may be no sensation even when the filling is forced beyond the canal. This is especially true when the pulp has been removed by pressure anesthesia and the canal is filled at the same sitting. A tooth from which the pulp has been removed by pressure anesthesia should seldom be filled until the apical tissues have had time to recover their normal sensitivity.

Mummifying agents. In no department of our work are good judgment and painstaking manipulation more urgently called for than in the filling of root-canals, and in a careful observation of this operation as made by conscientious practitioners I have been impressed with the harm that has been unwittingly done by irritation of the tissues beyond the root through over-zealous attempts at filling the canals perfectly. By this statement I have, of course, no reference to the numberless instances where practitioners do not make any reasonable effort to get into the canals at all, but pin their faith to mummifiers and drugs rather than to honest mechanical procedures. In our profession too much dependence is often placed upon drugs to do what should be achieved by manipulative means, and the patients suffer as a consequence. It may be permissible under certain circumstances to seal in a pulp chamber and root-canal some one of these so-called mummifying agents for temporary purposes till the tooth recovers from a chronic soreness, but no dependence should be placed upon them for permanent work. Just to the extent that we depend upon drugs to do the work which legitimately should be accomplished by manipulative effort, do we jeopard the interests of the patients and lower our efficiency.

MOUTH-WASHES.

In this connection attention should be called to another mistake which the profession is fostering, namely, the constant use of mouth-washes among our patients, irrespective of whether they are indicated or not. I am far from condemning the legitimate use of carefully prepared stimulating and antiseptic solutions in those cases where the abnormal conditions of the mouth indicate such treatment, but mouth-washes should be limited to their proper indications, and should be eliminated from use in healthy mouths, as their use in the latter has a tendency to do more harm than good. If the mouth is healthy, there is always a danger of disturbing the normal balance by the introduction of agents which tend to interfere with function. The maintenance of function is the surest way to health, and consequently the healthiest mouth is the one in which function is most fully performed. The best stimulant for the gum tissue and the best polisher of enamel is the friction of food in the function of mastication, but unfortunately mastication is not always carried out to its fullest efficiency. We use toothbrushes to make up this dereliction, but the moment we begin to depend upon solutions and washes to do the work which should be done mechanically by mastication and the brush, the tissues begin to deteriorate. I am not arguing against the use of a wash in inflammations of the tissues and puffed and swollen gums, nor am I criticizing, as some have done, the mouth-washes which are on the market today, many of which seem to be carefully compounded, but I venture to suggest that if the patient could be prevailed upon to have removed from his teeth all irritating deposits, and his gums properly stimulated by massage and the friction of food and the brush, restoration to health would be just as certain as by the use of drugs, and it would be more permanent. But just here is the rub! It seems so difficult to induce the average individual to properly care for the teeth and gums by mechanical means unless some powder, paste, or wash is prescribed as an incentive. In this particular respect these agents have been useful; they have been the means of inducing many negligent individuals to take care of their mouths, which otherwise would have been neglected. Most of the dentifrices are prepared with a pleasant flavor, and they impart to the mouth a refreshed and wholesome feeling which the patients highly appreciate.

The whole tendency of our teaching should be in the direction of preserving the normal balance between function and health rather than glossing over any pathological conditions by a false reliance on drugs. This is too much akin to the habit of using powerful and not always pleasant perfumes as a substitute for good, honest cleanliness of person.

The individual who carries with him the cleanliness of the bath has little need for musk, and he whose teeth and mouth are kept constantly clean is seldom obliged to resort to the "doping" of drugs.

POTASSIUM SULFOCYANATE *VERSUS* DIACETIC ACID.

By C. FRANKLIN MAC DONALD, D.M.D.,
ASSISTANT IN OPERATIVE DENTISTRY, HARVARD UNIVERSITY DENTAL SCHOOL.

DR. R. W. BUNTING'S article upon "Potassium Sulfocyanate in the Saliva" in the December 1910 issue of the DENTAL COSMOS seems to discredit the present methods for determining potassium sulfocyanate (KCNS) in the saliva.

A change in these methods would be so revolutionary that we have made a careful and thoughtful repetition of Dr. Bunting's experiments. This work was completed in a month's time, but as no mention of his findings appeared in any of the dental literature, it was concluded not to publish the results until others either confirmed or denied the conclusions.

In the November 1911 issue of the COSMOS, mention is made of these conclusions as being accepted, and Dr. Ferris has incorporated them into his revised methods for salivary analysis which he presented as chairman of the Research Committee to the National Dental Association. Hence it seems well to present the results obtained in experimenting along this line in the research laboratory of Harvard University Dental School.

The very first experiment tried, that of removing with ether the color produced by the addition of $FeCl_3$ to a fairly strong solution of KCNS in water, showed that for some reason all the color produced was not taken up by the ether. Upon extracting the colored ether and adding fresh ether, no more color was removed; even after twenty-four hours the water still retained a very heavy color.

This experiment immediately raised the question of the relative solubility of this color compound, $Fe(CNS)_3$, in water and in ether. Still further, it was found that the colored ether which had been removed in the first part of the above experiment, was completely decolorized by the addition of water. However, this experiment was made upon a strong solution of KCNS in water, so it was only fair to try an experiment upon saliva, carrying it out as suggested by Dr. Bunting.

To be positive that the saliva experimented upon should contain KCNS, 1 cc. of a 0.01 per cent. KCNS solution in water was added to 4 cc. of well-boiled saliva, the boiling being intended to drive off any diacetic acid present. (See Ogden, "Urine Analysis"—"Distinction between KCNS and diacetic acid.")

This saliva plus KCNS was then carefully carried through the process recommended by Dr. Bunting (page 1351). The result was that the ether took on only a very faint color as distinguished by comparison in a shell tube with fresh ether, but the saliva retained a distinct color. To this mixture of ether and saliva one drop of a 0.01 per cent. KCNS and one drop of $FeCl_3$ was added; this produced a deeper red color in the saliva, and the ether now showed a slight color without using the shell tubes. Another test was made in a similar manner, using a less strong solution of KCNS, 0.005 per cent., and no color was removed by the ether, but upon the addition of more KCNS the ether took up a faint color. These experiments were conducted in white porcelain dishes, so care was taken not to be misled by a possible reflection from the colored solution beneath the ether.

These experiments surely confirm the preliminary one conducted upon the water solution. It seems patent that for some reason the ether does not remove the color compound entirely in the presence of water; that is, the compound $Fe(CNS)_3$ must be more soluble—or in some concentration be soluble by preference—in water than in ether. Yet this relative solubility in water has a limit, since it is evident that above a certain concentration the ether will remove all this excess, otherwise no coloration whatever would appear in the ether.

The main object, now, was to determine, if possible, what this concentration was, and whether it was high enough to account in any way for Dr. Bunting's failure to get a test in certain salivas.

To arrive at this, fourteen similar experiments were made, one of which is here described in order to illustrate the method used: A solution of 0.01 per cent. of KCNS in water was carefully made; 1 cc. of this solution was diluted with 8 cc. of H_2O. Of this dilution, 1 cc. was taken, two drops of 10 per cent. $FeCl_3$ was added; a reddish color developed and 3 cc. of ether was now added, and the whole mixture was shaken three times at intervals of one minute, allowed to settle, and about 1½ cc. of the supernatant ether drawn off and compared for color with an equal bulk of fresh ether in a small test tube. Looking down through the depth of the liquid, the result was negative.

In a similar manner other tests were made, the strength of the KCNS being gradually increased, until a solution of 0.1 per cent. diluted 1 : 6 gave a slight evidence of a positive test (a *very faint* straw color). A 0.1 per cent. solution diluted 1 : 4 gave the first unquestionably positive test, a faint brownish color showing in the ether. Assuming, however, the dilution of 1 : 6 to be positive, this shows that a solution of the concentration of 0.0125 per cent. KCNS, which is 0.1 per cent. diluted to 1 : 7, will not give a test in ether.

Dr. Bunting carefully determined the amount of KCNS in twelve salivas, and the highest content he found was No. 7, being 0.0051 per cent., which gave, after evaporation, a positive reaction in ether. This 0.0051 per cent. is less than one-half the content used in our experiments.

Hence in those salivas in which Dr. Bunting failed to get a test in ether, is it not conceivable that the total quantities of KCNS were so small that, even after concentration to one drop of water, the addition of one more drop of water plus the water contained in the two drops of $FeCl_3$ added, was sufficient to dilute the KCNS so that the concentration fell below 0.0125 per cent., and therefore the ether did not remove any of the color compound? Likewise in those salivas which gave a "faint" reaction, the final watery solution was sufficiently concentrated so that the ether removed all color down to the concentration of 0.0125 per cent.?—beyond which the color remains in the water.

Again, Dr. Bunting records no tests made to prove that the color remaining in the watery solution (of which he makes no mention, but it hardly seems possible it could have passed unnoticed) is not $Fe(CNS)_3$, but he assumes it to be so. No work was done upon this phase of the question, as it seemed unnecessary in view of the experiments in the water solutions.

From these tests it seems proper to take exception to Dr. Bunting's finding and conclusions. His test is in error 0.0125 per cent., which is altogether too much for scientific purposes when quantities of 0.0051 per cent. are being tested for.

Of the possibility of diacetic acid in the saliva there is nothing to be said as yet. Should diacetic acid be present, however, this danger is eliminated by the fact that all tests for KCNS are made in salivas acidified with a drop of concentrated HCl, and HCl will destroy the color produced by diacetic acid and $FeCl_3$. The above fact is easily demonstrated by a simple experiment with diacetic acid and water.

To conclude: Dr. Bunting's findings seem to be in error, and, until further evidence is produced, the old test of KCNS with $FeCl_3$ will continue to be used, and all the past data relative to KCNS will continue to be preserved as valuable.

RESEARCH LABORATORY, HARV. UNIV. DENTAL SCHOOL.

HEMORRHAGE IN HEMOPHILIA.

By ETHAN W. SCOTT, M.D., D.D.S., Sebastopol, Cal.

THE subject of this paper is one which does not often come under the immediate notice of the dentist, but when it does it taxes his ingenuity, tact, and resources, and perhaps causes him no small amount of uneasiness, for on its successful handling may rest his reputation. I refer to hemorrhage in hemophiliacs or "bleeders," as they are known to the laity, following the extraction of one or more teeth. Obviously unjust as the criticism would be, death, or in fact any serious condition resulting from treatment in a dental office, would bring undue notoriety to all concerned, particularly the dentist. The majority of patients expect to be half killed, anyway, when they come to us, but they refuse to be killed entirely. As to the condition itself, Osler quotes another authority who lays the blame on the blood-vessels themselves, stating that the inner or the muscular coat is at fault, but fails to state any reasons. Hemophilia is one of the few hereditary diseases, and has been traced through many generations—two centuries in one family; curiously enough, the males of a family are the sufferers, the disease being transmitted by the females, the latter not being affected, but passing it on. This is, however, not always true, as variations have been noted. Hemophilia is found more frequently in Anglo-Germans and in robust and healthy individuals. After very trifling injuries, hours and even days will pass with no indication of the hemorrhage ceasing. One case is on record, reported from the state of New Jersey, in which oozing continued for a year.

TWO CASES OF SEVERE HEMORRHAGE STOPPED BY INJECTION OF NORMAL SERUM.

The immediate cause of my interest in this subject was two cases which came under my observation in the early part of this year. Following the unsuccessful attempt to save the roots of a badly broken-down lower second molar, I found it necessary to extract. Previously, however, I had noticed that the oozing from the tissues around the cervix of the tooth, consequent upon slight injury, which at times is unavoidable, was rather more prolonged than usual, and as a precaution I asked the patient if he was a "bleeder," and further questioned him if he had ever noticed that a cut in any of his fingers—the patient being a butcher—bled very long. The answers were all contrary to what they should have been, and I therefore performed the extraction. The patient left the office still bleeding, and continued to bleed for two-and-a-half days, when I applied the treatment which I will describe shortly. The hemorrhage was constant. I extracted on the 16th of May, at 3 P.M., and succeeded in stopping the hemorrhage on the 18th of that month between 10 and 11 P.M.

It is superfluous to enumerate the drugs used to combat hemophilia, everything of real or fancied value having been tried. Calcium chlorid, in the books at least, is considered reliable, but in three cases I know of it was of no value whatever, and one writer states that a continued use of the drug, with the idea of rendering the hemophiliac immune, only renders the condition worse. Lately strontium lactate was employed in one case, the time of coagulation being reduced to one-third within an hour after taking it. The dose was 1 gm., but the effect was not permanent. The patient always carried the drug with him, and succeeded in reducing the hemorrhage in less than twelve hours, whereas before it continued for several days in succession.

In the intravenous or hypodermic injection of normal serum, however, we have a remedy easy to administer, safe, sure, and prompt in its results. The procedure was first introduced by Weil of Paris in 1905. Transfusion of blood has given the same results, but as transfusion or intravenous injection of serum can only be performed by competent surgeons, and in a hospital, it is out of the question for a dentist to attempt it. The hypodermic method of administering the serum, however, is within his province, and should therefore be employed by him. In case no normal serum is available, in an emergency a large blister on a willing candidate, one not belonging to the patient's family or being a "bleeder" himself, can be made to yield the necessary amount, the patient's back being rendered as aseptic as possible, and care being taken in procuring the serum from the blister. In the biological laboratories, such as the Cutter Laboratory at Berkeley, Cal., sterile normal horse serum can be obtained in any amount.

In the case of extraction of the lower molar, I injected 30 cc. under the skin of the back, making one puncture. Before I had finished dressing the puncture the patient informed me that the bleeding had ceased. In this case the result was probably aided by the increased coagulability which follows prolonged oozing, for in a subsequent case, that of a brother of the patient just described, 20 cc., *i.e.* 10 cc. less than were employed in the first case, required between three and four hours to accomplish the desired results. The cause of the hemorrhage was a stab wound in the thigh, and as he was known to be a bleeder, the serum was given immediately. A sufficiently large dose should be administered in the beginning, *i.e.* not less than 30 cc., as a state of anaphylaxis results, reaching its maximum at ten days and continuing for about three weeks or more, during which time it would be extremely dangerous to repeat the dose.

Next to human serum, rabbit serum is best, but it is rarely obtainable. Horse serum is always obtainable in any amount and in sterile bottles. Cow serum must never be used, as it would kill the patient. The serum can be injected with any large hypodermic syringe. I used a Pasteur syringe, holding 10 cc., with a large needle such as veterinarians use, the whole procedure being carried out under strict asepsis.

With the cessation of the hemorrhage, prompt recovery took place in both cases, the wounds being cleansed and dressed according to approved practice.

CORRESPONDENCE.

DENTAL SURGEONS IN STATE MILITIA.

To the Editor of the Dental Cosmos:

Sir,—Following is a copy of the decision of the chief of the division of Militia Affairs, War department, Washington, D. C., regarding the establishment of a dental corps in the organized militia of the United States, for the information of the dental profession. It forms part of the *Bulletin of Militia Notes,* issued by the division of Militia Affairs, War department:

November 1, 1911.

[*Page 10, para. 34.*] Section 3 of the Militia law requires the organized militia to conform to the organization, armament, and discipline of the regular army. The act of March 3, 1911, authorizes a dental corps to be attached to the medical department, prescribing certain limitations as to numbers of this corps. The dental corps is a part of the regular establishment, and in the opinion of this office the organized militia would be authorized to attach to its medical department a dental corps in conformity with the proportion prescribed by the act of March 3, 1911, and the officers of such corps, when on duty, would be entitled to pay out of the federal funds allotted to the state.

R. K. Evans, *Brig.-General,*
Chief, Div. Militia Affairs.

It is the opinion of that office—

That under the act of March 3, 1911, the members of the state militia dental corps, whenever established, shall be at once commissioned as first lieutenants in that organization. That the contract feature of the act of March 3, 1911, does not apply to militia organizations.

That the question of the contract service should not be raised by members of the dental profession who may desire to become members of the state militia dental corps of any of the United States. That they should assume it to be their right to be commissioned as first lieutenants of the dental corps.

Therefore, I beg of those members of the dental profession who may desire to become members of the state militia dental corps and attached to its medical department, under no circumstances to either refer to said contract service as contained in the law governing the regular army, or to accept any position other than as commissioned first lieutenant, if referred to by any authority of the state or militia organization. It is absolutely necessary for the welfare of the dental profession throughout the country, in its progress and standing, that its members conform to this condition.

Should the question be raised by other than dentists, then will be time to demand an official ruling of the Judge Advocate General of the Army for final settlement of the question. In my opinion, based upon conditions applying to other officers in the militia organization of the United States, the question of contract service will not be raised, but I have written this warning to prepare members of the profession to confront the situation should it arise.

Remember that what applies to one state must apply to all in their organizations of militia, and be governed accordingly, in order that the best interests of the dental profession may be guarded and its social standing upheld by the members thereof.

Respectfully submitted,
Emory A. Bryant.

Washington, D. C.

PROCEEDINGS OF SOCIETIES.

NATIONAL DENTAL ASSOCIATION.

Fifteenth Annual Meeting, held at Cleveland, Ohio, July 25-28, 1911.

(Continued.)

SECTION I: Prosthetic Dentistry, Crown and Bridge Work, Orthodontia, Metallurgy, Chemistry, and Allied Subjects.

Chairman—Stanley L. Rich, Nashville, Tenn.
Vice-chairman—B. Frank Gray, Los Angeles, Cal.
Secretary—Harry E. Kelsey, Baltimore, Md.

(Continued from vol. liii, page 1315.)

Thursday—*Second Session.*

The second session of Section I was called to order on Thursday afternoon at 2.30 o'clock, by the chairman, Dr. Stanley L. Rich, Nashville, Tenn.

The Chairman announced as the first order of business for the section the reading of a paper by Dr. Calvin S. Case, Chicago, Ill., entitled "The Question of Extraction in Orthodontia."

[This paper will be published in full, with numerous illustrations accompanying its text and discussion, in the February and March issues of the Cosmos.]

The Chairman then declared Section I adjourned until a later session.

Friday—*Third Session.*

The third session of Section I was called to order at 10 o'clock Friday morning, July 28th, by the chairman, Dr. Stanley L. Rich.

The first order of business as announced by the chairman was the reading of a paper by Dr. Varney E. Barnes, Toledo, Ohio, entitled "Dental Impaction and Preventive Treatment."

[This paper is printed in full at page 1 of the present issue of the Cosmos.]

Discussion.

Dr. Burt Abell, Toledo, Ohio. We have to take off our hats to the man with an idea. Whether or not we agree with all that Dr. Barnes has said, we must recognize that he has given us the results of most painstaking investigation. He is specially to be commended for the scholarly and gentlemanly way in which he delivers his message, free from the personalities that so often mar otherwise valuable papers and discussions.

I have one criticism to make, and at least one question to raise. Without close attention to the text of the paper, we are left to infer that Dr. Barnes has no use whatever for the alignment arch and horizontal tubes, while in fact, in his own practice, he follows his preliminary work of opening the suture with this very same alignment arch.

The question I would raise and would ask Dr. Barnes to answer is this—What takes place in the mandible? We have no suture there. Do not the teeth really move through the process, as when traction is applied with the alignment arch and ligatures? If so, the advantage would lie simply in the control of the apical arch when the apparatus recommended by him is used on the mandible.

We have no reason to believe that the size of the teeth is in any way affected by prenatal or postnatal conditions of nutrition or malnutrition, neither are we warranted in saying that heredity plays a determining part in their size, except that they seem to bear a definite relation to the *general type* of the individual. With the jaw itself it is different. Here malnutrition, either prenatal or postnatal or both, lack of vim—for want of a better word—giving rise to adenoids and the consequent train of habits, etc., all leave their imprint on the size of the jaw. Given a condition in which the teeth of the size normal for that particular individual are endeavoring to erupt into a poorly nourished or undeveloped jaw, we have a crowding together which causes a reaction in the deeper tissues, a condition which our essayist has been pleased to call impaction. I firmly believe it is here and here only that we may look for so-called hereditary manifestations of malocclusion. With the definite malpositions of the teeth, heredity plays no part. The child inherits a certain type of feature, a certain tendency to early maturity or a lack of tone or vim, all having an effect on the size and shape of the jaw, with consequent lack of room for the erupting teeth. These deciduous sets, which the parents tell us were "just perfectly beautiful, so regular and close together," to the orthodontist are sure evidence of the lack of the continued growth of the jaws, and are a sure harbinger of impaction later. Dr. Barnes has been preaching for years the need of the interdental space in deciduous sets. Judging by the numerous reports that come to us orthodontists through the parents, of advice given by dentists to let the malocclusion alone until all the permanent teeth have erupted, we would conclude that it is not generally known among dentists that the normal growth of the jaws stops at about the eighth year and, if there is to be a *normal* stimulation of bone development without a break, the treatment must be begun before that age.

In March Dr. Barnes gave me a hint of the subject-matter of his paper, and showed me in his office a great many of his cases in different stages of treatment. I was particularly impressed by the perfect palatal arches and also by his perfect control of the apical arch. I became convinced that he was working along a practical and rational line, and since that I have put eleven cases under treatment in which I judged that his plan was indicated. I realize that the time has been too short to fully demonstrate the value of the essayist's methods so far as these individual cases are concerned, but I find that I have been able to expand the arches laterally with no tilting of the molars or bicuspids, which almost invariably occurred in expansion with the horizontal tube and alignment arch.

Within the last month I have had an opportunity to prove Dr. Barnes' statements as to the nervous effects of these impactions and their relief by the orthodontic treatment he recommends. Sherwood S., ten years of age, presented with a class I case of malocclusion—Angle's classification—with the arches so shortened that there was absolute approximation of the upper first bicuspid and laterals. The upper canines were nearly ready to erupt labially to the laterals and there was a very marked constriction of the arches linguo-buccally. The boy was as near perpetual motion as a boy could be, twitching the face, throwing out the chin with a peculiar stretching of the neck muscles, making queer noises with the nose, etc., his health was delicate, his appetite poor. I adjusted an appliance according to Dr. Barnes' plan and opened the suture rapidly for four weeks. Last week the mother presented the boy, being perfectly delighted that nearly all his nervous habits had disappeared, and the general health and appetite were so much improved that he hardly seemed to be the same child.

I am thoroughly convinced that expansion by opening the suture is the normal and logical way—that it is not only another way of accomplishing our aim, but marks a step in advance that we shall all have to recognize and adopt in our practice. Whether we employ the appliance that Dr. Barnes uses, or some other method, is another matter. As far as I have been able to see, he has evolved a very efficient but somewhat cumbersome set of wires, vertical tubes, bands, etc., which, if used intelligently, will produce the desired result. I have found by experience, however, that it is not foolproof, and that it must be used carefully.

Our only alternative with the single molar anchorage and horizontal tube when we wish to enlarge the apical arch, is to wait for nature to fill out the bone tissues within from two to three years, which, however, she sometimes neglects to do. If the only benefit to be derived from using Dr. Barnes' appliance is the control of the apical arch, it would be well worth using, *when indicated.*

Dr. Barnes' contention regarding the intermaxillary anchorage is one of vital importance, and presents two phases. Under certain conditions it answers the requirements perfectly. Our trouble in a great measure has been its misuse. We have known nothing to take its place, and have had to use it in all cases of classes II and III. We have felt the need of anchorage outside the oral cavity, or one at least that did not jeopard the position of the teeth in the opposite jaw, but none of us seemed to be able to develop one, and it was Dr. Barnes who suggested the face-mask. I have two cases in which I am using it. In one of these, neither jaw had developed mesially sufficiently to impart an harmonious outline to the features.

I could do no more than put the teeth in normal occlusion without some point of anchorage outside the oral cavity, as this did not sufficiently fill out the face, so I began the use of the face-mask at night, and have been able to produce a much better facial outline.

Though I have yet to demonstrate it to my satisfaction, I believe that a great deal of our difficulty in retention is due to the disturbance posteriorly of our anchor teeth, particularly the upper first molars. Impaction of the second and third permanent molars results, their efforts to erupt disturbing all our previous efforts at correction. I cannot emphasize too strongly that we should never move posteriorly a tooth which by such movement will encroach upon a space belonging to a tooth yet unerupted. We have not planned largely enough nor looked deeply enough into our cases. I am most happy that Dr. Barnes has given us a jolt and compelled our attention in the matter of impactions. True orthodontia is preventive. It should be concerned with appliances only as a means to an end. To be preventive it must work with the young, and I predict that the day will come when practitioners will look upon the present-day methods and practices much as we, in our self-conceit, look upon the attempts of the men of long ago who merely "straightened teeth"—and the upper incisors and canines at that—methods which served their time as stepping-stones, but are to be outlived and left behind for better things.

The whole world is waking up to the value of the humanitarian work among the school children as a preventive measure. As progressive men, let this idea of early treatment for the relief of impactions get a grip on our very souls, remembering that we are just on a ledge of the mountain of progress and not at the top. Let us not look back and down into the valley of past struggles through the mist of mistakes, but turn our faces upward toward the top as a safer, better procedure, and one worthy of men.

Dr. S. M. WEEKS, Philadelphia, Pa. I wish to pay my respects to the essayist for his unusually well-written paper. The facts are so clearly stated and the premises so well chosen as to leave no particle of doubt as to their intended meaning.

This paper contains much food for thought and investigation along many lines; one or two particularly appeal to me, and to these I would direct your attention for a short period.

The essayist mentions certain prenatal and postnatal factors which influence dentition. I do not disagree with these facts, but I feel that he should have continued, and considered the effect of insufficient use of the dental organs upon the development of the permanent arch. I believe it to be an undisputed fact that the uncivilized races have a very small percentage of irregular teeth, and we know that the amount of use given to the teeth in the preparation of the food for assimilation is far in excess of that given by civilized people; the greater the amount of culture, the relatively smaller is the amount of work required to prepare the food—and the proportionately greater is the amount of tooth impaction.

This, I believe, should be a factor in our consideration of impactions, and an equally important phase of our treatment, inasmuch as it would indicate the development of such customs in food selection and preparation as would favor those requiring a much greater amount of mastication, this training to be applied to the individual as soon as he is permitted the use of solid foods.

The matter of "orthodontic pressure improperly applied" opens for discussion a very large field, and one which I cannot let pass without observation.

In the early years of their practice, practitioners are apt to follow blindly principles and methods which produce results that become nightmares when subjected to the test of years. This I believe holds true also of some of the teachings which many are following at the present time, and which have been referred to by the essayist.

In the treatment of impactions one principle should stand out above all others, namely, that assistance be rendered early, and the cause and progressive development in the wrong direction be averted as early as possible. This means that the greater part of the work of the orthodontist in the future should be done upon the deciduous teeth.

The action of the expansion arch upon the permanent teeth as ordinarily understood was bad enough, owing to its effect of contracting the apical arch, but when used upon the deciduous teeth it became a travesty upon good judgment. The essayist pointed out how its action produced an arch placed too far posteriorly in the skull, and thereby caused impactions of the second and third molars. I have seen this expressed in the result of the treatment of many cases where there was an evident tilting backward of the first molars.

I believe that this condition will be more generally recognized when enough time has elapsed to enable us to become convinced of actual impactions.

Again, when an appliance of this character is used upon the deciduous teeth for purposes of expansion, it may produce exactly the opposite effect, inasmuch as it contracts the arch represented by the apices of the roots of the deciduous teeth, and thereby causes a contraction of the developing permanent arch in *all* directions.

I should like to add in passing that, while not disagreeing with the essayist's views as to the early completion of the lateral development of the arch, I believe a more careful consideration of that point will be beneficial.

I have used for a number of years the plan of determining the proportions of the arch as outlined by the essayist, and find it productive of very satisfying results; but in my opinion it is not practical to depend upon the X ray for determining the dimensions of the anterior permanent teeth, however desirable it be. An X-ray photograph is subject to too many factors of error. In my belief we have scarcely begun to realize the far-reaching effects of impactions upon the nervous system, and while it is difficult to furnish proofs, yet I have noted so many cases where there was an evident improvement of nervous conditions during the progress of and following orthodontic treatment that I am in sympathy with the essayist's view on that phase of the subject.

In closing, I would like to say that it would add much to our understanding of some of the vital features of the essayist's paper could we be more certain of the manner in which bone growth actually takes place in cases subjected to arrested development and subsequent artificial stimulation.

Dr. Robert H. W. Strang, Bridgeport, Conn. I wish to congratulate Dr. Barnes on the results of his treatment in the cases shown.

The fundamental thought upon which the essayist has based his paper is one that will bear a great deal of emphasizing, for its importance has certainly been underestimated. Pressure exerted at a critical period in a child's life on one of the largest of the cranial nerves must be productive of reflex phenomena of a serious nature, as has been clearly demonstrated to us clinically. A third molar unable to force its way to its normal position may give rise to symptoms manifested anywhere in the body. What must be expected, then, if several teeth intimately related to the nerve attempt to push their way into a greatly underdeveloped arch, and are obliged eventually to assume a position of maleruption necessarily associated with continued pressure!

That such a condition can be prevented is a fact no longer questioned. One of the greatest triumphs of modern orthodontia lies in the fact that it is no longer a specialty for the correction of malocclusion alone, but also for its prevention. The problem is one of assisting nature in building up enough bone to accommodate the permanent teeth as they erupt.

The essayist has laid great stress upon the necessity of producing sufficient lateral development. This necessity is not to be questioned, and when sufficient lateral space is obtained, the permanent incisors will be able to erupt in good alignment. Normally, beginning with their eruption, there should be a distinct forward growth in the region of the premaxilla and the lower incisors to afford room for the permanent canines. According to my experience in such cases of retarded development this forward growth does not occur even after the lateral growth has been produced by artificial stimulation. This means that our work of prevention is not completed when we have produced sufficient lateral development. We must also stimulate the normal forward growth of the incisors after their eruption. It may have been noted that Dr. Barnes mentioned the necessity of carrying the incisors forward in the treatment of several of his cases, but I feel that he should have laid greater stress upon this item when speaking of prevention.

With these two main thoughts of the essay, *i.e.* the liability to dangerous pressure symptoms from impaction, and the possibility of preventing impaction, I thoroughly agree. There are, however, some minor theories, upon which Dr. Barnes has based many of his deductions, that I would question decidedly.

I am unable to comprehend Dr. Barnes' reasoning that, because the mother's milk fails to properly nourish the infant, we may know that "prenatal conditions were not correct or normal," and that "therefore prenatal development must be more or less deficient."

The nutrition of the child *in utero* after the third month is taken care of by the placenta. There is no direct connection between the child's blood and that of the mother. The placental villi assume charge of the selection of the proper food materials and of the oxygenation of the blood. The phenomenon of the mammary glands of the mother failing to select and produce proper nourishment for the child after birth is no sign that the placental villi have not been able to do so before birth.

That artificial feeding is responsible for maxillary under-development I do not question; but I believe that another factor of greater importance must be taken into consideration than improperly modified milk. This has been expressed with great emphasis by Dr. Woods Hutchinson.

Normally the child at breast must exercise a great deal of physical force to obtain its food. The jaws are in constant motion compressing the nipple and breast; and with all this activity the food is obtained only a few drops at a time. Contrast this with the conditions present in artificial feeding. With the soft rubber nipples so commonly used the baby is able to get its food without exercising any of the muscles of mastication, and consequently bone growth is not stimulated. Furthermore he obtains this food mixture by the mouthful, and it passes on to the stomach, where it is at once converted into large masses of curd which can never be broken up and assimilated. Hence the jaws are not developed in the bottle-fed baby, primarily because they are not exercised and secondarily because the food is not assimilated.

Further, Dr. Barnes mentions heredity as producing a tendency toward inharmonious development of the bones and teeth. It is true that we know comparatively little about this subject, but certainly the knowledge that has been gained goes to prove that all the tendencies of heredity are to produce normal organisms. If this were not so, the whole world would long ago have been inhabited exclusively by freaks.

Dr. Barnes' conception of the normal development of the jaws and subsequent eruption of the permanent teeth is well and clearly stated, but his idea that lateral development of the arch is caused by a growth of bone along the median suture which forces the maxillæ apart is without scientific foundation. This lateral growth is an interstitial one, accompanying the formation of the permanent teeth within the bone and above the deciduous set. It is true that if the suture be opened and held open, new bone will form and fill in the space, but that is another process and not normal development. It is for this reason that I would contend that the methods used in preventive treatment should be such that this interstitial growth be encouraged rather than a growth along the median suture. We should make our work conform as far as possible to nature's plan; in other words, let the pressure exerted by the appliance be strong enough to stimulate a normal interstitial bony growth, but not of sufficient power to open the suture. Nor can I see how it is possible that a whole denture erupt in a position too far posterior in its relation to the skull. Until better proof can be furnished to discredit it, I am pleased to accept the teaching that the upper first molar is one of the most stable and fixed landmarks in facial anatomy (see Angle, *Items of Interest*, June 1906).

Dr. Barnes' contention that the first permanent molar is held back because the teeth anterior to it usurp territory that should be occupied by the molar in its forward movement does not appear to be a physical possibility. This large tooth is erupted about five years before the second bicuspid, and is completely developed at the time the bicuspid is ready to take its position. Its normal time for beginning this forward movement coincides with the loss of the deciduous molars. In other words, the moment the first deciduous molar is shed the first permanent molar starts on its journey forward and continues on its way when the second deciduous molar is lost. In this movement it is forced onward by the developing second molar. If, when it has reached its normal forward position, there is still room for the bicuspid to complete its eruption all will be well, otherwise the bicuspid, weak and under-developed, will be prevented from assuming its correct position in the arch. Certainly the first molar will never wait for a bicuspid to erupt and usurp territory that does not belong to it.

In closing, I wish to quote these words of John Ruskin, which will serve us well as a motto if we are to achieve success in our chosen field:

> We are not sent into this world to do anything into which we cannot put our hearts. We have certain work to do for our bread, and that is to be done strenuously; other work to do for our delight, and that is to be done heartily; neither is to be done by halves or shifts, but with a will; and what is not worth this effort is not to be done at all.

Dr. Barnes (closing the discussion). Dr. Abell's question as to what becomes of the lower teeth in opening the suture may be partially answered by referring to Fig. 12, which shows a similar appliance for lateral and anterior expansion of the lower teeth. No suture opening takes place in the lower jaw, and the expansion is slower and more difficult to attain. The lateral expansion is first accomplished, then the anterior one. The lower teeth and arch are made to fit the upper, and in antero-posterior mal-relations of maxillary and mandibular teeth the adjustment is made with the intermaxillary or facial anchorages or with both.

I most heartily commend what Dr. Weeks has added in regard to the thorough use of the jaws and teeth in the preventive treatment. At the present time there is too much tendency to raise children on mushy foods, including milk, gruels, etc. Sweet milk, while containing all the necessary food value, is still primarily intended for the very young animal. The proper food for the infant and young animal with teeth would seem to be food that requires chewing, and this chewing is unquestionably a great factor in the proper development of the jaws and teeth. The chewing of solid food should therefore be of distinct benefit in the preventive treatment of impactions.

Dr. Weeks has accented the essential point in calling attention to the principle involved in early orthodontic treatment of the deciduous teeth, which means the prevention of impactions and irregularities before the permanent teeth appear. The X rays do not give exact dimensions, but good pictures will indicate the approximate widths from which an approximate arch may be calculated, and later corrected upon the eruption of the permanent incisors.

Dr. Strang has spoken very kindly in regard to the results shown in the several cases illustrated, but I trust that no one will take these cases to illustrate anything but the average results that I am obtaining under the principles advocated. I have laid great stress upon the lateral development required, but as these illustrations are made from average cases, it must be observed that my charts of arch expansion show the necessity of anterior and lateral expansion. Lateral expansion must be attained *first* because of the early eruption of the incisors, which require practically the entire lateral width to erupt, before they can fully take up their anterior positions.

Dr. Strang claims to be unable to comprehend that failure of the mother's milk may indicate that prenatal development was more or less deficient. I do not comprehend how one can logically reason otherwise, particularly since no less an authority than G. Stanley Hall says: "One of the earliest of the long degenerative stages which mark the decay of ethnic stock is imperfect mammary function and inability to nurse offspring sufficiently." ("Psychology of Adolescence.") What shall we say about the nutrition of the fetus *in utero* before the third month? Would it not be subject to the conditions of disease or health? And is not the failure of the mother's milk a result of disease or ill health? Surely we can only expect to raise healthy normal stock from healthy ancestors. In regard to heredity I wrote, "Heredity may produce a tendency to inharmonious development of bone and teeth," because I did not wish to befog the main ideas, but if heredity is a factor—and no one can prove that it is not—the sooner the preventive treatment is begun the better both for the teeth and for subsequent development.

The median suture is a known region of development, and that development must be lateral. Teeth assume irregular positions chiefly because of deficient fundamental bone development. If we find deficient lateral development we must conclude that at least some of that deficiency was along the suture, and the best imitation and approximation of the normal development seems to be attained by the rapid opening of the suture. In practical cases I have found that suture-opening and relief of impactive pressures in the maxilla will result in better digestion and lessened nervousness long before the slower expansion of the mandibular teeth could occur, where there is no possibility of suture opening. The expansion of the mandibular arch is necessarily more stimulative, while the maxillary expansion approximates the immediate, and is better, providing the pressures exerted range within the physiological limits. In support of suture opening and rapid expansion I should add that I have obtained better health results from these methods than from the employment of the slower so-called stimulative light pressures.

When nature has failed we must not depend upon her to yield readily to slight stimulation, and further, children presenting such defects should be relieved as quickly as possible; there are other things in life that require some of their attention and time.

If my effort has shown the relation between impactions and dental irregularity and suggested a rational preventive treatment therefor, I shall feel amply repaid for a great expenditure of time and energy. The discussions have been excellent, and I wish to thank the speakers for their careful, thoughtful consideration of what I believe to be a new and necessary form of orthodontic treatment.

Dr. Rich. Before adjourning the section, I wish to take this opportunity to give public recognition to the work of Dr. Gray, vice-chairman of the section. Although he was unable to be present at this meeting, Dr. Gray has done good work in arranging our program.

Section I was then declared adjourned until the next annual meeting of the association.

SECTION II: Operative Dentistry, Nomenclature, Literature, Dental Education, and Allied Subjects.

Chairman—L. L. Barber, Toledo, Ohio.
Vice-chairman—Frank I. Shaw, Seattle, Wash.
Secretary—Joseph Head, Philadelphia, Pa.

Wednesday—*First Session.*

The first session of Section II of the National Dental Association was held at 2 P.M., Wednesday, July 26th, Dr. L. L. Barber, Toledo, Ohio, chairman, presiding.

The first order of business, as announced by the chairman, was the reading of a paper by Dr. C. N. Johnson, Chicago, Ill., entitled "Mistakes, Common and Uncommon."

[This paper is printed in full at page 53 of the present issue of the Cosmos.]

Discussion.

Dr. J. R. Callahan, Cincinnati, Ohio. I feel it a great honor to have been chosen to discuss a paper written by Dr. Johnson, who occupies so high a position in our profession.

In regard to root-canal treatment, I agree with the essayist so fully that, if we were to be called to the chair to operate upon the same case, it is likely that our agreement would be more apparent than when we attempt to put our ideas in writing.

"Just to the extent that we depend upon drugs to do the work which legitimately should be accomplished by manipulative effort, just to that extent do we jeopard the interests of the patients and lower our efficiency." In this declaration Dr. Johnson has made a terse statement of a great truth. I wish the above quotation could be so impressed upon the minds of the profession that it might not be for a moment forgotten. Chemical assistance is indicated, however, in many cases in the removal of dead and diseased tissue and in opening root-canals for drainage and access. Twenty years' experience has proved to me most conclusively that sulfuric acid in forty per cent. solution is a most valuable assistant in opening and smoothing root-canals, and when carbonic acid is liberated within the root-canal by the union of sulfuric acid and sodium bicarbonate solution, the canal is at once rendered clean, surgically clean.

Schreier's sodium-potassium is at times an invaluable adjunct; fine threads of diseased tissue can often be removed from the canal by the proper manipulation of this agent.

The text-books in use in our colleges in my opinion do not give as clear an idea of the use of either of the above chemical assistants as might be desirable. In my opinion, not one of the ready-made, much-advertised root-canal filling materials is nearly as safe as the old-fashioned chloro-percha and gutta-percha cone fillings.

Even this method is open to very serious objection. For several years I have been endeavoring to produce a more satisfactory root-canal filling, and this desire and effort has not been entirely in vain. I desire to call your attention to the following procedure: A piece of rosin such as the violinist uses on his bow is procured and a solution of chloroform and rosin is prepared, about three parts chloroform to one part of rosin. The solution should be quite thin. To a portion of this solution No. 1, as much pink gutta-percha is added as will make the solution of about the consistence of chloro-percha as generally used, this solution to be No. 2. The root-canal is dehydrated in the usual way, using chloroform instead of alcohol, dried thoroughly, and then solution No. 1 is pumped into the canal, and allowed to remain a few minutes. The dentin will thereby be saturated with rosin. Then, with sterile paper points any surplus solution is removed from the canal, which is then filled with solution No. 2. The gutta-percha cone is gently pressed to place, warmed after it is in the root-canal with hot air, and then packed in the canal with a cold instrument.

A tooth treated in this manner out of the mouth and made into a thinly ground slide will show that the tubuli are filled to the cementum with rosin. The canal is filled with rosin and gutta-percha, a mixture that is hard and insoluble in body fluids, does not shrink, and is as compatible with the surrounding tissue as is chloro-percha.

I do not believe it will be a mistake to give some attention to this suggestion.

The most serious mistake that I have noted in any and every walk of life, not only in the dental profession, is the failure or inability on the part of many people to profit by their own mistakes. I know of people who tell of their mistakes as jokes, and laugh at what they seem to think funny. Such people, as far as my observation goes, are failures. The serious study of mistakes is one of the underlying causes of the wonderful progress of the world.

The great art and science of medicine and surgery has been evolved with infinite labor and patience from a mass of mistakes that is appalling to contemplate. Beginning with biblical history, the word brain does not occur in the Bible. The ancient Hebrews believed the heart to be the seat of the soul, while the mind, in their opinion, was located in the kidneys, and all tender emotions were in the bowels. Hippocrates spoke of the brain as a gland, and the supporters of this theory attempted to represent the brain secretion as a subtle fluid which they termed "animal spirits."

Descartes taught that the left ventricle of the heart separated these animal spirits which had been generated in the brain, distilled them out of the blood into a very living and very pure flame, and then distributed them through the arteries. These animal spirits, therefore, were made to account for everything normal and abnormal. Hence it was from noxious vapors and humors that every variety of bodily disorders took its rise.

Under date of 1618 Hilkiah Crooke, in his work on "Anatomy and Physiology," says that one great office of the hairs of the head is to lead off the vapors which otherwise would choke the brains and make them smoky. As to the condition of the brain of the bald-headed man, we may draw our own conclusions! The growth and development of a science and the mental growth and development of an individual are based on the same fundamental principles. The evolution of medicine and surgery strongly argues for the great advantages to be derived from giving serious attention to our own personal mistakes, whether they be common or uncommon.

Another common mistake made by dentists is the effort day after day to work at the chair in a state of fatigue, or frequently in a condition bordering on exhaustion.

Scientific research has demonstrated that the resting brain and nerve cells show large and well-rounded nuclei; exhausted brain and nerve cells of the same order show shrunken, irregular nuclei, while in extreme fatigue cerebral anemia is produced.

Professor Mosso, in his work on Fatigue, says: "I exposed the brains of four dead pigeons which had made the journey from Bologna to Turin, and compared them with those of the normal birds. The difference in color was so apparent that everyone in the laboratory observed it; in the fatigued birds the brain was pale, almost bloodless. This fact probably explains why the quails on their arrival from Africa do not see so well as usual, and why we ourselves are incapable of doing brain-work after great fatigue."

Adam's "Pathology" tells us: "It is a familiar experience clinically that overwork favors infection; that those engaged in hard work with long hours and inadequate periods of rest are apt to succumb to tuberculosis, pneumonia, influenza, intestinal infections, etc.

"The sense of fatigue is due to the accumulation of the products of muscle activity in the circulating blood and the action of the same on the higher centers."

In the state of daily fatigue it is impossible for a dentist to do justice to his work or to himself, and it is a serious mistake for him to neglect the great specific, namely, rational out-of-door exercise and wholesome rest.

Dr. F. W. Low, Buffalo, N. Y. I should not attempt to discuss this paper but for the fact that those appointed to discuss it are absent.

Before entering into the discussion I trust you will pardon me for telling you one or two stories suggested by the picture on the stage to which you have given the place of honor. Thirty-five years ago I was a first-year student in the New York College of Dentistry, in which Dr. Atkinson was a lecturer. At that time Dr. Atkinson used to deliver his lectures with his coat off. He was accustomed to say that he knew his boys so well that it would not disconcert him to be asked questions in the midst of his lecture, and if there was anything we did not understand or believe, he wanted us to hold up our hands until his attention was attracted. Thus when he said that we should use a drill in the root-canal until we had penetrated, or at least had opened into the apical foramen, my hand went up, for that seemed to me a difficult procedure for a young man intending to go into practice, in fact for anyone. I asked Dr. Atkinson how we were to know just exactly when we had penetrated the end of the apex. "Why," he said, "in boring into a pumpkin with a gimlet, when you get through the rind, the gimlet would take a little start, would it not?" That was a mistake, yet I commenced to fill teeth that way. Dr. Atkinson also taught to use a barbed broach in the root-canal until a little drop of blood appeared on the end of the broach, indicating that it had advanced far enough. I used to try to fill pulpless teeth for a dollar and a half, and I think my success in those cases was due more to the drop of blood than anything else I did for that remuneration. I soon came to the conclusion that it would be just as well to allow nature to do a part of this work.

Some years afterward I read before the union meeting of the Seventh and Eighth District Societies an essay on phagocytosis, as the result of some experimental work. I made these experiments upon a washerwoman, promising her that after the experiment I would remove the offending teeth and make her an artificial denture. In a central incisor that had been dead for some time, without using any antiseptics whatever, I cleansed the root mechanically, sealing it with gutta-percha—as at that time chloropercha was not being used—trying to see if nature could take care of itself. The woman suffered no discomfort for a month, and at the end of the month I extracted the tooth, split it open in such a manner as to expose the gutta-percha and the root-canal, immersed the pieces in agar-agar culture, and no bacterial formation resulted, showing that during the three weeks or more which the tooth remained in the mouth, if I had left any living micro-organisms at the apex or about the apical space, the phagocytes had disposed of them. So I came to the conclusion that this operation, so difficult to accomplish, is taken care of by nature if given a chance, and I have become more and more convinced of this through skiagraphs, which show many more cases that have been over-treated than those which have been under-treated.

At the joint meeting of the Fifth District and the Jefferson County Dental Societies held in Watertown, New York, last fall, I read a paper entitled "The Most Essential Constituent to a Good Mouthwash." One of the members, knowing that I had made extensive experiments with potassium sulfocyanate, had written to ask if it would not be feasible to incorporate that drug in a mouth-wash. In answer to that question I wrote that paper. In the closing sentence I said: "The most essential ingredient for a good mouth-wash is good wet water"—and I believe this can be substantiated today. I have never listened to a paper with more pleasure than the one just read by Dr. Johnson.

Dr. S. C. G. WATKINS, Mont Clair, N. J. I do not like to have the subject passed without saying a word at least. While I agree with Dr. Johnson in nearly every respect, I would take exception to the disuse of the drill. The essayist was very emphatic in saying that the use of the drill is never indicated. I cannot agree with him in that statement, as I believe the use of the Gates-Glidden drill in canals to be always indicated. I do not mean that we can always reach the apex, but we should open up the canals as far as we can without danger, that is one-half, two-thirds, or three-fourths of their length. By that procedure we shall far more likely reach the proximity of the apex than if we did not open the canal with the drill. Dr. Callahan's method of using sulfuric acid can then be used much more easily. After the canal is enlarged and cleansed, it is much easier to make a perfect filling all the way to the apex.

Dr. W. M. CLAWSON, Cincinnati, Ohio. I have used root-canal drills for a number of years with excellent results. For the Gates-Glidden drill I do not have as much use as for the Beutelrock drills. As made today these will break at the shank when they break at all, and can then be easily removed, so that the danger of breaking them in the canal is minimal. If a root-canal can be entered easily with a root-canal drill, the latter is not needed, but it is of value in canals that are so small that they cannot be entered, and then it is advisable to use the smallest size made. No force should be exerted in driving the drill into the canal, but it should be manipulated as delicately as an instrument in surgery of the eye. By gradually advancing and receding without applying force, simply allowing the drill to follow the canal, it can be opened with care and patience to the end of the root, and any abscess can then be treated, unless the canal is extremely tortuous. Many practitioners do not seem to consider the breaking off of a broach as a serious matter, yet they regard the breaking of a drill as terrible. I would rather have a root-canal drill break than to have to tie a string to my broaches to keep patients from swallowing them.

Dr. F. A. BALLACHEY, Buffalo, N. Y. If any of the members present are engaged more or less exclusively in prophylactic work, I should like to have them discuss the question of tape, as I understand that this is used a great deal.

The question as to whether it is advisable for everybody to use mouth-washes and dentifrices, regardless of whether their mouths are in a bad condition or not, deserves extensive discussion. The public is learning to use these preparations because they are being widely advertised, yet by no means through the dental profession alone. I usually advise patients in regard to the use of dentifrices that it is best to clean the mouth with water and brush first. Then the tooth and gum surfaces are in good condition for the use of a dentifrice wherewith to finish the process of cleaning. This is important to my mind. Take, for instance, the picture with which the Colgate Co. advertise their new ribbon paste, the picture showing the brush covered with a layer of paste. I am inclined to think that such an amount of paste applied to the teeth at the beginning of the operation will so coat the teeth surfaces that any mucus attached to them is liable to be glossed over, and on close inspection a covering of paste and underneath that a coating of mucus will probably be found.

I therefore think it a good plan in cleansing the mouth to use the brush with clear water first, and then to apply a moderate amount of dentifrice.

Dr. T. M. Milam, Little Rock, Ark. It has been said that science is truth, and that truth depends upon the viewpoint of the individual practicing a scientific principle. In Arkansas we do not take time to trouble about the gums in cleaning teeth, and for that reason we do not injure them in prophylactic treatment. There we practice on the scientific principle of leaving conditions alone when we cannot better them.

I think the essayist has made a great mistake in speaking of mistakes being common and uncommon. All mistakes, in my opinion, are common. I have practiced every method that I have ever heard of or have ever seen demonstrated, except filling a tooth with amalgam; I have learned from Dr. Johnson, Dr. Atkinson, and other authorities, yet I have not gained much. I have spent forty years in the practice of dentistry, and expect to spend ten more, and I have ruined teeth with drills and without drills, and have seen others doing the same. For my part I will never again put a drill in a tooth. I have tried prophylactic treatment according to Dr. Ebersole and the essayist, but have never accomplished much, though I hope to know better and do better.

Speaking of ethics and honesty, I have known a great many dentists in my time, and I believe that a man is as honest as his knowledge will enable him to be.

Dr. Johnson (closing the discussion). I wish to refer especially to the method of filling root-canals mentioned by Dr. Callahan. If the filling material which he has suggested will be found to penetrate the dentin to the cementum, it will be very valuable for us, and I thank him especially for bringing it to our attention on this occasion.

Dr. Watkins misunderstood me slightly in regard to the use of the drill in a canal, and I cannot blame him for that, because I covered that part so briefly, as the whole paper was brief. I am beginning to have a horror of reading papers that are too long and tiresome. Should I live long enough to read as many papers as I have read in the past, these papers will probably be reduced to half the present length. I intended to demonstrate that the use of the drill is not always necessary, but that it is desirable to ream out slightly canals constricted near the pulp-chamber, in order to find the direction of the canal. I insert a drill no farther in a canal than up to its curvature. I agree with the gentleman who was so enthusiastic over the use of the drill, that it is hazardous to insert a drill in any canal beyond the point where we have reason to believe it to be straight. In most canals I would rather depend upon a broach than a drill, but I have not placed a barbed broach in a root-canal for ten years, trying to employ instead a broach that is not so easily broken.

I wish to thank my friend from Arkansas for his enthusiastic indorsement of my remarks. Such indorsement coming from Arkansas is more highly gratifying to me than if it came from any other section of the country, for the reason that Arkansans usually speak from the shoulder as he did, and voice their convictions, and it is always worth while listening to such men, whether we agree with them or not. In one point, however, I disagree with Dr. Milam. I understand him to say that we are all as honest as we know how. I wish to Heaven this were true! If mankind generally were as honest as they know how, we would have no need of penitentiaries in this country. We may be "as honest as we can," but if we were as honest and did as well as we know how, there would be no need for further human progress from that moment.

The next order of business was the reading of a paper by Dr. W. R. CLACK, Mason City, Iowa, entitled "Review of a Paper by Dr. P. B. McCullough, Entitled, 'Wherein Clinical Evidence is At Variance with Extension for Prevention.'"

[This paper is printed in full at page 25 of the present issue of the COSMOS.]

Discussion.

Dr. J. V. CONZETT, Dubuque, Iowa. If I were to make any criticism in regard to the paper, it would be that Dr. Clack wrote it at all. In this day I do not believe that extension for prevention needs an apologist. It is true that there are men here and there who do not believe in extension for prevention, but I believe that this is because they do not understand it; for as we go to different parts of the country and attempt to explain what Dr. Black means by extension for prevention, we find that the men who before that time were antagonistic and opposed to the principle, after they understand what Dr. Black means, heartily indorse it. One of the first objections raised against extension for prevention by those who do not understand the principle is that it is criminal to cut teeth all to pieces, and I heartily agree therewith. We should not cut one particle farther than is necessary to save a tooth, and extension for prevention only means that the tooth should be cut far enough that it shall be saved. Some practitioners remove the carious portions of a tooth without correcting the condition that caused the caries, and in consequence there will be a recurrence unless immunity has set in. Those who practiced dentistry for any length of time before the practice of extension for prevention was advocated know that patients whose teeth had been cut in the manner indicated returned, after a period of twenty years, perhaps, presenting these cavities in good condition. Now, after a period of fifteen years, I find recurrence of caries around the fillings which during all these years had saved the teeth, not because of properly understood and applied scientific principles, but because the patient had arrived at the period of immunity. These teeth would not have decayed during this period no matter how they were filled, but had I carried out the lingual and buccal walls to the proper extent, there would not have been any recurrence of caries to this day, because at these very points the fillings failed.

After a practitioner has once thoroughly understood and applied the principles of extension for prevention, he will never return to the old method, as it is the easiest way to fill teeth. Frequently, for the patient's sake, men object to cutting teeth in that way, yet patients have told me since I have been practicing this method that they would not want their teeth filled in the old way, because from their standpoint the new way is the easiest.

The question of immunity and of extension for prevention involves the etiology of caries of the teeth. We have learned from the teachings of Miller, Black, and Williams that caries is caused by the invasion of the tissues by a micro-organism which grows under the gelatinous plaque of Williams. This plaque cannot attach itself to the teeth in portions exposed to the excursions of food in mastication, to the movement of the tongue or lips, or to proper cleansing of the teeth with the tooth-brush, but it does attach itself in places protected from the excursions of food by reason of conditions which we are now beginning to understand because of the recent work of Dr. Black. We know that in certain conditions, in which there is perhaps overfeeding or faulty metabolism of some sort, there is precipitated in the mouth and around the teeth glucosin, which adheres to the teeth, followed by the formation of bacterial plaques. The fastening of these plaques on the tooth protects the micro-organisms from dislodgment, and furnishes an osmotic membrane through which the micro-organisms can receive their pabulum from the fluids of the mouth, thus preserving their vitality until the enamel is penetrated. If the portion of the tooth that can be so attacked by organisms of caries is not removed, we leave the tooth in a condition favorable to caries. In the light of the present knowledge of etiology, when a patient presents teeth which need intervention because of caries, it is our duty to carry the margins of cavities so far that the patient will be able to keep the margins of the fillings clean in every respect. That is all that extension for prevention means. In some teeth it may be necessary to cut to a considerable distance bucco-lingually because of the condition of the approximating teeth, but in a large majority of cases it is not necessary to cut very extensively if the filling is properly contoured and the contact point is properly provided, allowing all lines of the filling to converge toward that point. If we make a proper contact point, the tooth need not be cut very extensively in order to bring the bucco-lingual margins within areas of immunity, because in so doing the margins will be so placed that the food excursions from occlusal to gingival will keep the margins clean.

In my belief the question of extension for prevention is one that is very much misunderstood, because in my experience nearly all the antagonists of this principle, after learning that extension for prevention means simply carrying the margins into an immune territory, which is not as far buccally or lingually as they had formerly supposed, have become disciples of this method, unless they are so old that it is impossible to teach them new tricks. And so I am sure that Dr. McCullough, although I do not know him personally, has attacked the principle of extension for prevention because of a misunderstanding rather than an understanding of the facts of the case, and after he thoroughly understands this principle, he will practice it rather than antagonize it.

Dr. J. B. Pherrin, DesMoines, Iowa. A few days ago there was a gathering of grizzled veterans of the North and South. Many of those old veterans who grasped each other's hands had before been enemies, yet there was a mingling of much pleasure with some grief. At that meeting men met who had fought battles and who recalled the times when the strife was strong; they had met again to rehearse these memories, and they were as much interested in the rehearsal of these events as they had been years ago in the events themselves. Here today we have a rehearsal of a battle that has long ago been fought, and the grievous part of this is that it has been necessary for Dr. Clack to reply to or discuss Dr. McCullough's paper. The lessons learned in past years from the battles between the armies of the North and South are daily taught to the present generation, and so it is with extension for prevention; it would not be long before gold filling with the principle of extension for prevention would be a lost art if someone did not keep up the enthusiasm and such men as Dr. Clack did not step forward to promulgate the proper idea. The young college graduates and the practitioners who learn these lessons see also the inlay, and thinking it much easier, drift into using inlays, and the gold filling would soon become a lost art if this subject were not discussed. Therefore in my opinion it is not necessary to make any apology for Dr. Clack's taking up this subject and trying to prevent the evil effects of wrong teaching.

When I first heard of extension for prevention I received the impression that we would have to cut teeth all to pieces. A short time afterward I made the acquaintance of a man who taught me the correct principle, his first lesson, which lasted from seven o'clock in the evening until three o'clock in the morning, being on the study of the conditions. This unfortunate paper is simply due to the fact that its writer has not understood the conditions.

One passage in the paper to which Dr. Clack replied, in my opinion, has not been brought out fully, namely, when the first essayist says that the extension of the line or base of filling beneath the gum line in some cases would mean that it would have to be extended almost to the apex of the tooth. We know that in cases of pyorrhea the recession of the gum in many cases has extended far up on the tooth. To those cases, of course, the rule is not meant to apply, and it seems that the essayist of the original paper has not studied the conditions of the cases, but has taken every rule as absolute.

As to the extension of the cavity toward the pulp, it need be extended only as far as is necessary to remove the carious portion and to obtain the proper form for the introduction of the filling.

The question has been raised whether this discussion is of benefit. In my opinion it is beneficial and necessary, because many practitioners have not studied the conditions, and it is requisite to repeat again and again these lessons until they are properly learned. As it has been necessary for centuries to continually preach the teachings of Christ over and over again, so with the teachings of Dr. Black; it will be necessary to continually preach in the years to come what Dr. Black and others have taught us.

Dr. C. W. Strang, Bridgeport, Conn. I would like to ask the essayist one or two questions. First, in what respect does the Black system of extension for prevention differ from the system as practiced and taught by Marshall H. Webb thirty-five years ago? Second, at what age or period in life is it advantageous or desirable to begin the practice of extension for prevention?

Dr. Clack (closing the discussion). I am very sorry that more of the members present did not rise to defend the methods they are practicing. I have the highest respect for the man who has the courage of his convictions and is willing to defend them at any time and place, but I have only condemnation for the man who uses methods of extension for prevention, or any other methods, but is too lukewarm to aid in their defense, and merely sits still and hears his methods assaulted without having the courage to defend them.

I did not write this paper entirely of my own volition. One of the gentlemen has suggested that Dr. McCullough is not present. It is not intended by this paper to criticize him alone, but also those fellow practitioners who were present this afternoon, and many of whom left because they would not hear a criticism of their methods, and did not dare defend them. My attention was continually called to Dr. McCullough's essay, not only by followers of the Black methods but by practitioners from the West who differ from us in their opinions. Friends have said to me: "Here is a man from Philadelphia, the recognized center of the world in regard to education and enlightenment in dental matters, and he maintains that extension for prevention is not only unnecessary, but criminal," and these practitioners were falling back into the old methods because this writer had published in the Dental Cosmos, a magazine that we all respect, a paper attacking the principle of extension for prevention, and it was for the benefit of these practitioners that this paper was written.

In reply to our friend who asked in what way Dr. Black's methods differ from those of Dr. Webb, I, as a follower of Dr. Black—would that I were able to follow him closer and appreciate him better!—honor and revere the memory of Dr. Webb, and when I hear it said that this is nothing new, and that Dr. Webb taught all these methods, I reply that Dr. Black never claimed that it was new. He claimed that he made investigations of fillings made after this method by Dr. Webb and others who used to make these extensions and contours, and that he found fillings so made which had resisted the ravages of caries for a great many years. But we speak of the Black system, because Dr. Webb did not live long enough to systematize this method; moreover, Dr. Webb was not a man who could do that—he was more of a worker at the chair, and Dr. Black is more of an investigator, a compiler, a systematizer. On the other hand, there are many men in this country who are not willing to give Dr. Black credit for his investigations, and who hail Webb, saying: "I am a follower of Webb, and I make fillings according to the Black system," though many of them could not recognize a Black preparation. These are the men who speak up most loudly about this matter. Every intelligent follower of Black reveres the memory of Webb, and many of them are his followers, and deplore the fact that death removed him before he had completed his work, if a man can ever be said to have completed his work. I am sorry that while Dr. McCullough could not be present, some of his friends —because every man has his friends and followers—did not see fit to stand up to the rack and defend the method that he advocates.

Dr. STRANG. The essayist has failed to answer the other question asked, namely, at what age it is advisable to begin methods of extension for prevention.

Dr. CLACK. I have seen fillings in the teeth of children of ten years of age, and a few of the members present have seen fillings made by Dr. Searle in the permanent molars of his own children at the ages of ten and twelve years which are now perfect, the children having grown to manhood and womanhood. It is not so much a question of age. Of course a certain development of the teeth is necessary. I think it is better to defer the application of the principle of extension for prevention until the apex of the root is fully developed. At one time I believed that it was impossible to make a filling in a tooth of a person less than eighteen or twenty years of age, because of the then supposed impossibility of getting sufficient condensation to make a filling that would withstand the stress of mastication, but we have no such difficulty now with our present knowledge of the teeth. While I believe it to be good practice to use some intermediary methods for a few years, with the permission of the Clinic Committee I would like to show tomorrow some twenty fillings that I have made for one patient, who was extremely susceptible. These fillings were made when the patient was sixteen years of age and from that time on. Some of these fillings have been in place now for eleven years, and I present them without having polished them, even on the occlusal surfaces to remove pits—because at the time they were inserted the pericementum was not in condition to withstand shock sufficiently to allow of the condensation of gold so as to prevent its pitting, but enough to prevent the recurrence of caries. I challenge anyone to find any recurrence of caries around these fillings. Not one of them has been replaced, and some of the members present have seen these fillings every year or two since the time they were made, and will witness that they have not been replaced. This patient is not immune, but is still extremely susceptible.

I could not state the particular age at which it would be advisable to begin this work for every patient. I have seen patients sufficiently developed at the age of thirteen, while others are more delicate at that age, when it would not be good practice to subject them to the strain inherent to making such a filling. Very soon after puberty, I think, it is comparatively safe to make these fillings, which depend largely on dexterity of manipulation. In that respect I have nothing to say about the practitioners in the East. We have nothing to teach to them in the matter of manipulation of gold, but we have much to learn from them in their delicate manipulation thereof.

The next order of business as announced by the chairman was the reading of a paper by Dr. JOSEPH HEAD, Philadelphia, Pa., entitled "The Necessity for Dental Education on the Subject of Mouth Antisepsis."

Section II then adjourned.

(To be continued.)

PENNSYLVANIA STATE DENTAL SOCIETY.

Forty-third Annual Meeting, Scranton, Pa., June 27, 28, and 29, 1911.

(Continued from vol. liii, p. 1428.)

WEDNESDAY—*Afternoon Session.*

(Continued.)

The next order of business was the reading of a paper by Dr. B. HOLLY SMITH, Baltimore, Md., entitled "Professional Progress," as follows:

PROFESSIONAL PROGRESS.

In Japan a beautiful custom is prevalent. When the trees, shrubs, and plants are in flower, the people visit them in concert and spend a portion of the day in admiration, as though to pay tribute to their wonderful bloom and to cultivate an appreciation of their glory. At the same time these admiring throngs are not unmindful of the patient toil of which this marvelous expression is the result, and not unheedful of the numerous enemies which have been successfully conquered in this glorious accomplishment. Today our profession is in flower. May we not pause and admire its progress to its present state, and with appropriate modesty suggest how it may best be brought to even greater perfection.

We are accustomed to regard the bloom of the flowers as a wonderful expression of nature, yet we all know that the plant must have its proper environment, food, and soil, and be protected from its enemies. It will not display its richest beauty unless it is healthy. The same holds true of our profession. Our beginners had little to start with except opportunity; the mouth was almost a completely neglected field, the importance of its being kept in a healthy condition being not only overlooked but disputed by practitioners of the healing art, and consequently by the general public.

THE RECOGNITION OF THE IMPORTANCE OF ORAL HYGIENE.

Owing to the persistent teaching and practice of dentists, not only do medical practitioners everywhere now recognize the importance of a clean mouth, but regard it as essential to health, if not to life itself. Throughout the world people are coming to know the importance of dental services. Governments, municipalities, and philanthropists are furthering this recognition by establishing infirmaries and hospitals. School boards and managers of public institutions are demanding that mouths in their care shall be made clean, and kept so. Never before in the history of the world has dentistry attracted so much attention or received so much consideration. With this recognition the practitioners of our specialty have themselves grown to a wider appreciation of their usefulness, and have everywhere manifested a commendable willingness to extend their aid to the poor, the ignorant, and the helpless. A vigorous growth of the altruistic spirit has sprung up in our ranks, and our men have shown themselves willing to make even unexpected sacrifices of time and money to carry on the propaganda for clean and healthy mouths. The best surgeons refuse now to perform capital operations until the mouths of their patients are put in order. Disqualification from employment in our army and navy for dental deficiency is the rule. This must soon extend to other branches of service, until those in authority will demand as an essential to general efficiency the efficiency of the masticating apparatus. .

In the Marion school, in Cleveland, Ohio, in one year the average efficiency of the students in a test squad was increased sixty per cent.; in Baltimore, at the parental school, a school for truant and refractory boys, out of forty examined not one had ever received other dental attention than extraction. The marvelous improvements made in both these instances will not go unnoticed by those seeking to make efficient men. Educators are publishing such facts broadcast, and they must be considered.

THE ARMY DENTAL CORPS.

Our government was forced to consent to the establishment of an army dental corps with rank, not only by our demanding it as a necessity, but by the growth of public sentiment in its favor. The same growth of sentiment in favor of a measure for our navy is apparent to anyone who has been interested in the subject, both the Surgeon-general and the Secretary having urged the passage of such a measure. All this seems to show that the day is dawning, or has dawned, when the medical man will find the dentist at his side, his co-worker in every field, and engaged in a service considered in no sense less honorable.

THE UNSCIENTIFIC STAGES OF DENTISTRY.

To account for a greater appreciation of our services, we should in fairness be able to say that they are today more worthy of that appreciation than they were in the days when they were not so highly esteemed. Associated with the kind of personal service which we, with the medical man, render, a certain dignity of character, completeness of information, and ability to inspire confidence is demanded. This in rare instances may have been acquired through gifted personality, but in most cases it has grown up through a certain preparedness, the result of study and research. In the pioneer days of dentistry there was little opportunity for this; there was study and research, to be sure, but it was distinctly unscientific. The methods employed were those of the individual, and not those approved by scientific workers in other fields of investigation. The literature in those days was not, as it is today, rich in the description of approved methods of practice and treatment, complete in the history of the cause and course of the diseases we have to treat, ample in the description of the origin and effect of the medicines which are used.

Our fathers in dentistry whom we honor were men of distinction, character, and education; but we forget that these few great men, who might almost be numbered on the fingers, are partly esteemed because of their superiority over the mass of dental practitioners of their day. The discredit which formerly attached to the dentist was largely due to the fact that the vulgarian and quack found dentistry easy of adoption, and the personality of the average dental practitioner was far beneath that of men in other professions. "Tooth *carpenters*" they were very properly called;—indeed, to dignify some of them as specialists of a trade which our Savior followed was a desecration of the term.

MODERN EDUCATIONAL REQUIREMENTS OF DENTISTRY.

Today it is impossible for anyone to begin the practice of dentistry without adequate preparation. Besides, one cannot even begin the study of dentistry without a preliminary training equal to that demanded for entrance into the schools of any liberal profession. The rank and file of the graduates of dentistry today compare favorably with those of any profession. When we consider that this standard has been acquired in so short a time—in little more than twenty years the requirements for graduation in dentistry having been raised from no preliminary requirements and a five months' course of instruction, to graduation from a high school and three years of seven months each, for a right to be examined for a dental diploma—it seems little short of marvelous. The bare facts should stop the critic's carping as to a lack of standardization in dental education.

The dental curriculum levies tribute on more sciences, more professions and specialties than does the curriculum of any other profession. Medicine, surgery, physiology, anatomy, pathology, chemistry, physics, mechanics, electricity, architecture, ceramics, metallurgy, photography, law, history, ethics, religion, and perhaps a dozen other sciences, are all embraced in it. Three years of this training should leave a man not only technically prepared to practice dentistry, but possessed of a more or less liberal education.

THE NATIONAL ASSOCIATION OF DENTAL FACULTIES *VS.* THE DENTAL FACULTIES ASSOCIATION OF AMERICAN UNIVERSITIES.

Much of the advancement in dental training has been the result of associated effort. The examining boards in their co-operation with the National Association of Dental Faculties have encouraged the elevation of standards and the exaction of requirements. It is safe to say that but for the formation of that association no such rapid improvement could have been possible. Perhaps some individual school might have advanced its standards to or beyond those of today, but it would not have been possible to have such general compliance with advanced standards without the influence of this association.

Those who have known the beneficent influence exercised by this organization upon dental education have naturally been indignant at the attacks which have been made upon it by the president and mouthpiece of a smaller organization of university dental schools. There is no reason why there should not be university dental schools, or why they should not flock together in an organization, but it is absurd that they should profess to require more thorough preliminary training, when they advertise nothing in excess of the National Dental Association's requirements, namely, graduation from a high school.

It would be a great advance if Harvard University, the University of California, and the University of Pennsylvania, like Johns Hopkins University Medical School, should require an A.B. degree as essential to matriculation. These institutions are largely endowed, and might well afford to conduct their departments with the reduced class-roll which would be inevitable at first; I do not believe that this would bring about a permanent reduction in numbers. The matriculation list at Johns Hopkins Medical School is much larger, though its fees are double and its requirements for admission higher, than those of other medical schools in Baltimore. But these university dental schools require not one whit more for essentials of matriculation than is demanded by the schools in the Association of Dental Faculties so roundly denounced by the California dean. In a paper published recently in the COSMOS this critic charges that the National Association of Dental Faculties, because it required its membership to charge one hundred and fifty dollars a year for instruction, is "a trust."

A uniform minimum fee is desirable in that it prevents underbidding for students by schools located in the same territory. Again, with the expensive apparatus, the extended curriculum, and the desirability of obtaining first-class teachers, it was decided that dentistry could not be properly taught for less. The expenses at the Johns Hopkins University are double this amount, and almost all medical schools charge that much. I am not sure but that some of the university dental schools who stand for Dr. Sharp's strictures charge the same fee. It would seem to me to be apparent that the establishment of dental departments in medical schools and universities was done for profit. The dental student takes many of his branches with his fellow, the medical student, and for such instruction causes practically no expense to the institution. I do not know of one single dental department which is being conducted on the eleemosynary plan, or which has not been made a source of revenue for the institution to which it is attached.

It may be possible that the association of teachers of dentistry with those of other specialties in universities has been an advantage to the former, in that it has brought them in touch with the methods employed in those institutions; and again, it has given dentistry the opportunity to show the world that she has exponents worthy of occupying chairs in our universities on an equal footing with other scientific men.

I am convinced, however, that the dentist has been a very insignificant atom in these large bodies, with little or no say in their management, and with not even a free hand as to his own department. In such association he has, in my belief, no opportunity to accomplish his best work.

In 1837 or '38 an appeal was made to a university to establish dentistry as a special department in the medical school. The appeal was rejected by the board of regents and faculty. That action by a few men might be forgotten or ignored if it had not reflected an attitude of mind which was generally prevalent then, and which, I am sorry to say, has not entirely subsided today.

A PLEA FOR INDEPENDENT DENTAL SCHOOLS.

The establishment of independent dental schools has resulted in a unique product of the healing art, the modern dentist, who has brought into that field of service a large appreciation of mechanics, of orthopedia, of chemistry and metallurgy, and who has amply proved the necessity of the service he renders.

It is not strange, then, that the very university which first refused as insignificant the offer to teach dentistry as a speciality of medicine should now have a large and flourishing dental department of considerable monetary profit to that university, or that other medical schools and universities should have established similar departments with like result.

This adoption for profit can only appeal to us when it is proved that it has produced practitioners of general superiority to those sent out from the purely dental schools. This has not yet been done, and while the university dental student has certain problematic advantages in the way of association, he suffers the penalty of being compelled to select for himself and his field of work instruction intended for the medical student, often given by a teacher who knows nothing of dentistry, and who, if he did, would not presume to embody it in his general course. Then—which is most humiliating of all—he will be graded as "only a dental student."

Unquestionably the entire thought and effort of a dental faculty to prepare a man to practice dentistry must be more effective than simply offering an opportunity to make a dentist of oneself out of what instruction may be gleaned from lectures intended for other purposes.

With the increased demand for dental attention for all the people, only a very small proportion of whom have heretofore sought it, it must be apparent that the output of the dental schools will find ample opportunity for service, and that the family of moderate means must receive attention for smaller fees than have heretofore obtained. Unquestionably this demand will be met by men who will be content to live modestly themselves. Many salaried positions will be created by governments and municipalities, the pay for which, as is the case with the health officers, vaccine physicians, and medical inspectors, will be appropriated out of the public treasury. With this prospect the schools teaching dentistry should be strengthened and improved, not annihilated and closed up.

Educators more and more are coming to believe that effective methods of training involve a more intimate relation of the teacher with the student—that men make more rapid and certain progress in small classes. If this is so in education generally, it is still truer of our special training. To close the doors of the smaller schools would of necessity increase the number in the already overcrowded classes of the larger institutions. My observations of the methods employed in the school in which I teach convince me that demonstrations and technical training should not be attempted in classes numbering more than eight students. In these small classes the teacher is in intimate contact with the student, who by questioning and close observation cannot fail to avail himself of the information the teacher is trying to impart.

Ever since 1839, teachers in dental schools—most of them being men of culture and education—have been seeking to build up a system of training which will produce the most competent practitioners of our speciality. By comparison of methods employed in the Faculties and the Pedagogics associations, these methods have been harmonized until today the subjects taught are the same and the methods of teaching similar in all of the dental schools and universities. Thus the strong have helped the weak, and by associated effort improvement has been made all along the line. Any effort to discredit the associations which have rendered possible this improvement should not be countenanced.

THE M.D. DEGREE DOES NOT MAKE A DENTIST.

Recently in our midst a nondescript has made his appearance, proclaiming, with no little pomp, that he renounces the D.D.S. degree and demanding that dentists be denied the right to practice dentistry unless they possess that of M.D. I cherish no antagonism to the M.D. degree, but as the possessor of this degree I fail to see how its acquirement could adequately fit one for practicing dentistry. Nor do I think that more of the recognized medical branches than are being taught in the dental schools today are essential to the preparation required. Dentistry could not be taught in less time than is at present employed. To compel every man so graduated to spend three or four years more in acquiring an M.D. degree would be an unreasonable hardship and injustice.

I am proud of the achievements of dentistry, and cast no slur at medicine when I say that these achievements have been accomplished with little help from that quarter—rather in spite of it.

Honor and shame from no condition rise;
Act well your part—there all the honor lies.
—Pope.

Study to shew thyself approved . . . ., a workman that needeth not to be ashamed. (2 Tim. ii, 15.)

Discussion.

Dr. H. E. Friesell, Pittsburgh. We all must concede that dentistry as a profession has made marvelous progress in the seventy years that have elapsed since the organization of the first dental college in the world, an institution which honors our well-beloved essayist by numbering him among its able faculty, and which in turn is honored by his connection therewith. But how many of us realize that much greater progress has been made in the last ten years than in the six earlier decades, or that still greater progress will certainly be made in the present decade?

The essayist has called attention to the remarkable strides made in dental education, which has more than kept pace with other specialties of professional progress. In all schools, excepting a few which are without the pale of any organization, the entrance requirements have been raised from a common-school education to four years of high-school work, and the present curriculum in representative dental schools covers from three to five times that of the schools of less than twenty years ago. In fact, the dental course today covers in three years an amount of work practically equal to that of the average medical curriculum in four years.

The unifying of the entrance requirements and curricula has been the work of the National Association of Dental Faculties and its offspring, the Institute of Dental Pedagogics, and I am pleased to have the essayist call attention to this fact, as I have noted with much regret the recent attempts of a newly formed organization to cast unjust reproach upon the older and much larger organization, and its direct or indirect attacks upon this parent organization. Such a narrow purpose seems scarcely adequate to the formation of an organization with such a high-sounding name, and the carrying out of such a purpose fails to harmonize with our conception of professional ethics or common courtesy. Like the essayist, I think it is about time that we stopped slandering our schools and endeavored to help them.

We have three kinds of dental schools today: Privately owned schools, dental departments of medical colleges, and university schools.

The privately owned schools were necessary in the past, because universities refused to recognize dentistry as a profession, or to provide buildings or equipment for its teaching; they did not consider dentistry worthy of membership in the university family. Dentistry owes its present status as an independent profession to the privately owned school. It is my belief, however, that the day of the privately owned school is nearly over, except in a few favorable locations. This is not due to any inefficiency in the work done in these schools, but solely to the fact that the rapidly increasing cost of dental education will soon make it impossible to do the work in an unendowed institution, and private schools seldom become endowed.

The dental department of a medical college, in my estimation, is entitled to sympathy, for the history of the relations between the two professions would not lead one to expect any philanthropic interest in dentistry on the part of medicine.

A school of dentistry in a *bona fide* university is the ideal dental school, provided the dental faculty is permitted to conduct the school for the best interests of dentistry, and provided also that economical tendencies do not foist a low standard of medical work on the dental students in lieu of a proper teaching of basic subjects for dental purposes.

In a school of this kind the university should control all the financial transactions and make up the deficits. Every teacher should be a practicing dentist or have had sufficient practice to become fully identified with dentistry. Each subject should be taught according to its application to dentistry. I am not in sympathy with those who would combine the two courses, or who would make the medical degree obligatory. I believe that dental teachers should be educated for teaching all of the subjects taught in the dental curriculum, and that the dental school no less than the dental profession should be independent of and co-equal with medicine.

With the class of men who are taking up dentistry and the greater demands by the public for a broader culture and more efficient education on the part of the dentist, the *personnel* of the profession is rapidly changing for the better, and those of us who do not keep closely in touch with the march of progress must soon be left behind. The path, however, is not all clear sailing. True it is that intelligent school boards, public institutions, hospitals, asylums, sociologic societies, etc., are becoming aware of the importance of mouth conditions, and through the influence of such organizations and such splendid movements as the oral hygiene propaganda in Cleveland and other cities the public is beginning to realize that the care of the mouth and teeth is of vital importance. Still there remains much hard work to do before dentistry comes into its own in the way of general recognition as one of the learned professions, and one equally as important as any of them.

Another defect in our position is the indifference of a large proportion of dentists themselves toward these important movements. These individuals are the ones who protest most clamorously about the commercialism of schools, the superabundance of dentists, the uselessness of dental societies except for advertising certain men as officers, and it is they who knock most loud and long on those who give their time and energy to free clinics, to the oral hygiene movement, and to other unselfish interests that establish dentistry's claims to recognition as a profession through its service to humanity.

The indifference of so many dentists to the importance of membership and interest in dental societies has retarded our progress as a profession, but I am glad to say this condition is being rapidly offset by the influx of the splendid type of men who have been entering our ranks in recent years.

For fear that the essayist who has taken such an optimistic view may form the idea that I am a pessimist, I wish to say that I believe that dentistry is just falling into her stride in the march of professional progress. I believe that the oral hygiene movement is the greatest opportunity we have had or will have to demonstrate the importance and claims of dentistry, and to prove our profession second to none in the efficiency of the service it can render our people. I look forward to the time when an unclean mouth will be considered unpardonable; when neglect of the teeth of children will be a greater crime than failure to provide them with an education. I look forward to the time when every hospital will have its dental staff, a fully equipped operating clinic, and a corps of dental nurses; when the mouths of the patients will receive greater care than any other part of the body—because they need it—instead of almost universal neglect, as is now the case. I look forward to the time when a physical examination of a patient will not be considered complete until an oral examination has been made by a dentist, and when the physician and the surgeon will ask for this dental examination and will be able to secure an intelligent one. When that day comes, as come it must, and shortly too, we shall not find ourselves looked down upon as "only dentists," nor shall we find in our midst snobs ashamed of the dental degree.

Dr. A. J. **Flanagan**, Springfield, Mass. Someone has said that the easiest person to deceive is one's own self. The word slander has been used here today, and before I proceed I may say that anything that bears the test of investigation, no matter how it may differ with our own views, is not slander.

Advancement means striving for the ideal. Dr. Smith, in my opinion, at times roams afar in what he calls criticism. Constructive criticism is simply a means of advancement, provided that the deductions are logical.

One man has spoken of the surgeon's refusing to perform operations without care of the mouth. That is true, but who is to blame for the opinion generally held of dentistry, and for the hospitals in the United States not being supplied with dental surgeons? It is ourselves.

The statement has been made that the methods of our predecessors were not scientific, and were those of the individual. I wish to state—almost in a whisper—that there are thinking minds not only in dentistry, but in the laity and in the medical profession as well, who think that many of our methods are those of a corporation. These are the days of the hundred-and-one nostrums that are being foisted on the profession of dentistry. These are not the ideals of our predecessors nor those of the individual practitioner, but they are facts that are confronting us today. In regard to the question of preliminary education, Dr. Smith says we should stop the carping critic. There are as many estimates of preliminary education as there are minds, and as many opinions in regard to this subject as there are states. The standard of preliminary education in Massachusetts is not the same as that of Maryland, and that of Maryland is not the same as that of Georgia. Therefore this question seems to be as broad as it is long; it depends on the opinions of individuals, localities, and states.

It has been said that the dental faculties were organized as the result of organized effort on the part of the colleges. If I remember rightly, in my institution in 1887, '88, and '89, the sentiment prevailed that it was the result of public opinion supported by state boards that produced the Faculties Association. What is the use of harping on university requirements? Is there any reason under the sun why a man with a better average preliminary education than we have at the present time should become a worse dentist? It is about time that some of the practitioners and teachers in dentistry gave us some authentic records along this line, other than wild statements. Dr. Smith in his paper admitted that the university man has social advantages. There must be some reason for that. Social advantage properly used by the profession of dentistry is one of the greatest needs of today, unless I have wrongly interpreted the opinions of men of prominence for twenty-five years.

Dr. Smith says he is proud of his profession. I am not only proud of our profession, but I am doubly proud of Dr. Smith, and yet I say with all honesty that the *esprit de corps,* the dominating spirit of our profession, has not advanced as our worthy forefathers wished it might. We cannot estimate by the past, but we must consider the present. I am trusting that the time will come when the fifty-three colleges of this country will have an estimate of education which we can rely on and which they will not be scrapping over; that they will have opportunities for investigation, so that, when a simple question in regard to dental practice comes up, we can go to our colleges to obtain the proper information from which to reach a decision. Then we shall no longer have to resort to the hundred-and-one nostrum makers for information as to the pathology and therapeutics of different diseases and remedies. Our colleges will then stand for ideality, success, and information. Last but not least, if our colleges are not in position to give us information regarding these essential problems, whence are we to secure it?

I want Dr. Smith to feel that what I have said has not been prompted by the spirit of the carping critic. He has painted a most beautiful picture, but it is one to be seen from a distance and not to be looked at too closely.

Dr. H. M. **Beck**, Wilkes-Barre. Dr. Holly Smith has spoken of the growth of public sentiment in favor of dentistry. Public sentiment demands dentistry today—good dentistry. Public sentiment demands dental surgeons for the army and navy, and it is now demanding free service for the poor children of the public schools. This same public is rapidly being educated to discriminate between the ethical practitioner and the anterior-gold-tooth man. Any profession, art, or science that has public sentiment back of it must advance, and we who are practicing dentistry today have a wonderful opportunity to show the world that dentistry is an exact science, and that the rank and file of the men who are practicing are progressive, ethical, and scientific men.

The dental college has been a great factor in our advancement. It is undoubtedly true that at one time there existed quack dental colleges and that these institutions were maintained with no other object or view than the making of money. Owing to the advent of examining boards, such institutions have been compelled to close their doors, and it is very safe to say that any student who has a college diploma with a state board indorsement has a liberal education, and is not only thoroughly competent to practice dentistry but also has the desire to advance his profession and show the world that his specialty is doing as much for humanity as any other branch of medicine.

In speaking of the association of teachers of dentistry with those of other specialties, Dr. Smith has the following to say: "I am convinced, however, that the dentist has been a very insignificant atom in these large bodies, with little or no say in their management, and not even a free hand in his own department." I feel that I am justified in saying positively that such conditions did not exist at the University of Pennsylvania during Provost C. C. Harrison's administration, and that the head of the department of dentistry was not only free to use his own judgment in managing his department, but was always called in council when matters of importance came up that concerned any other department of the university. Furthermore, upon the resignation of C. C. Harrison the matter of putting a dentist in the provost's chair was seriously considered.

A profession, an art, or a trade is exactly what the men practicing that profession, art, or trade make it, and if we are not receiving the recognition that is due to us as a profession, we have no one but ourselves to blame. The dental millennium will come when we earn it, and not before.

Dr. SMITH (closing the discussion). I wish to thank the Program Committee for assigning to the discussion of this brief paper three of my best friends, who have been so temperate in their criticism. I was gratified this afternoon to hear from your distinguished president-elect that there is a firm in Pittsburgh that has employed the entire time of a very well known and reputable dentist to take charge of the mouths of its employees, and to devote his exclusive attention to them. The precedent will be followed all over the country. Dental efficiency will always be demanded.

The next order of business was the reading of a paper by Dr. JAMES J. WALSH, New York, N. Y., entitled "How Old the New in Dentistry!" as follows:

HOW OLD THE NEW IN DENTISTRY!

One of my favorite occupations in leisure moments, and one which has become so absorbing that it is a hobby—and hobbies are fine things to cultivate to keep off worries—is to trace in the past anticipations of what we are inclined to think of as most modern. At first there did not seem to be very much material with which to occupy oneself in this line. The more I learned of the past, however, the more did I find in it what we are apt to think of as novel in our time. I was not surprised, then, when a lady student of Egyptology announced not very long ago that the pictures of Egyptian women of very early dynasties, about 2500 B.C., wore the hobble skirt. Indeed, it seems that that fashion had been rife in Egypt—whether from choice or from lack of material or from some cunning device of the men to keep the women from running from or after them is not very clear—for five or six centuries. I am quite sure that the "merry widow" hat is not recent, and the sheath skirt, of course, is as old as it can be, and has been used whenever the thin woman became fashionable.

EARLY EFFORTS IN PHARMACOLOGY.

Of course dentists are not interested in skirts, that is, not any more than is absolutely necessary, and I am only illustrating how old the apparently new may be. I had occasion not long since to point out to druggists, while addressing the New York branch of the American Pharmaceutical Association, that most of their problems of the present day were quite old in human history. For instance, there is great complaint at the present time that druggists have to keep too many different drugs, and that some of them are used only very rarely. In Egypt, some 2000 years B.C., there were, according to the Ebers papyrus, seven hundred drugs in what we may call the Egyptian pharmacopeia, and complaints of the same kind were heard. In Rome, Galen complained that druggists substituted and gave his patients "something just as good" as he was trying, when they did not have the original material, but that he preferred to have his patients take what he wanted them to have. He also complained that there was counterfeiting in drugs, and that nice long names, usually derived from the Greek, like ambrosia and nectar and the like, were given to combinations of drugs and supposedly added greatly to their efficiency. It is just this that the Council on Pharmacy of the American Medical Association has been trying to prevent in recent years.

MEDICINE IN EGYPT.

We shall not be surprised, then, if we find other anticipations of medicine and surgery and dentistry in the very olden time. Several years ago I published in the *Journal of the American Medical Association* some pictures of surgical operations from a tomb in Egypt, which was erected not later than 2500 B.C. Evidently the decorator had considered it suitable to glorify the reputation of the surgeon buried in the tomb by showing pictures of him at work operating—our surgeons get their operations before the public before death. One of the operations, by the way, was the opening of a carbuncle, apparently, on the back of the neck. Human diseases, of course, have not changed, and the carbuncle doubtless came quite as frequently on the backs of the necks of elder Egyptians as they do on our own. We know of the existence of other diseases. For instance, just at the present moment we are running through an epidemic of infantile paralysis—anterior poliomyelitis, as it is scientifically called—in this country. We have had literally thousands of cases of it in the last few years. It is interesting, then, to realize that the skeleton of the mummy of a prince of one of the early dynasties of Egypt which is preserved in the museum of the University of Pennsylvania shows, in the opinion of Dr. John K. Mitchell of Philadelphia, signs of just such deformities in the bones as usually follow infantile paralysis when the little patient is left lame.

COLLECTIONS OF ANCIENT SKULLS EXHIBITING EARLY EFFORTS OF SURGERY.

An examination of the skulls preserved for us from old Egypt—and I may say that many of them are four or five thousand years old—shows that the type of human skull has not changed in all these years. We have heard so much of evolution in recent years that probably most people would be inclined to think that there must be great differences in the skulls of the men of the olden times from those of the present generation. It might be presumed that the older skulls would approach the animal type more closely. No change of any kind, however, has been found worth noting. I may say in passing that as to the still older skulls that we possess—that from Neanderthal, for instance, and others supposed to be at least as old as the neolithic age—excellent authorities in anthropology, as for instance Virchow, have insisted that the supposed animal characteristics are really pathological conditions. It was because these pathological conditions rendered special skulls much harder and less liable to deterioration that these specimens were preserved for us. Virchow, for instance, an authority in anthropology, in his time completely scouted the idea that they represented anything like the missing link. It was hoped that collections of skulls—and when he died his was the best in the world—would show the existence of missing links, but they have failed to do so.

These collections of skulls show a number of interesting medical and surgical features, as, for instance, the occurrence of trephining in very old times, but have been rather disappointing otherwise. There are marks of the trephine having been used—or at least openings made into the skull during life for some reason, for there are traces of subsequent growth —in old Egypt, in Babylonia, in the old Etruscan territories, and in America before Columbus' time. The specimen of a Peruvian skull from an antique grave exhibiting this was one of Virchow's prize specimens.

DENTISTRY AMONG THE EGYPTIANS POORLY AUTHENTICATED.

It might be hoped, then, that we would learn much about the teeth and their treatment in the olden time. Though the Egyptians rose to a very high plane of medical knowledge, they seem not to have done much for the teeth. We have remedies of various kinds for toothache, but in spite of the most careful search, no trace of tooth-filling or of the replacement of teeth by artificial means has been found up to the present time in old Eyptian remains. This is all the more interesting because the oldest medical document that we have, the Ebers papyrus, written not later than 1600 B.C. contains a list of some seven hundred drugs that were in frequent use among the Egyptians. They used them in all forms. A little later we have the records of their having many specialists among their physicians. Herodotus tells that human diseases were divided into thirty-six departments, and the physician who treated one form of disease would not treat others. There seems, indeed, to have been a rather careful observation of the limits of their specialties by various physicians.

No gold fillings found in mummies. A number of reports of the finding of teeth filled with gold and of gold apparatus of various kinds for the mouth have been made. These have not been authenticated, however; the reports seem to have arisen from superficial observation. Many mummies had their faces covered with gold leaf for preservative purposes. Sometimes, in the course of the ages, the gold leaf was rubbed off, except some which adhered to the teeth. This gave a curiously deceptive appearance which led to the declaration that the Egyptians used gold fillings. This is Professor Kirk's explanation of the many false reports in this matter.

Influence of the Egyptians' diet on their teeth. A study of Egyptian skulls seems to show that the Egyptians suffered from the same kinds and varieties of dental diseases as we do at the present time, though these occurred with less frequency than at present. This is not surprising when we recall that among the Egyptians the preparation of food did not nearly so often as among ourselves obviate the necessity for chewing. We are rapidly becoming a non-chewing race in the proper sense of that word. We still masticate meats, but these are exactly the food materials that require very little chewing, and indeed, need only to be divided finely enough to facilitate swallowing and be quite ready for stomach and intestinal digestion. The animals that eat meats do not chew, and indeed, have no chewing teeth, but only cut and tear their food into pieces and then bolt it. The animals that eat grain and starchy substances, however, generally chew and chew their food for a long time, swallowing and then frequently coughing it up and chewing it again—for that is what the process of rumination or chewing the cud in such animals as the cow consists in.

Unfortunately, with our modern cooking methods so many of the grains and starches are cooked so thoroughly that very little and almost no chewing is needed. It is a rule that whenever the human organism does not need to do a thing, it does not do it. Accordingly, the human race has taken to swallowing mashed potatoes, *purées* of peas and beans, and bread that has been softened by fluids almost without any chewing. This seriously hampers that phase of digestion belonging to the saliva in the mouth—and by which a piece of bread, if sufficiently chewed, can be made to taste sweet before being swallowed, because the starch is converted into sugar—and also sadly interferes with the cleansing of the mouth.

People are sometimes surprised at the excellent preservation of the fine teeth often noted in the mouths of poor peasants when they grow old, though they have taken no care at all of them in the ordinary modern sense of care of the teeth. They have taken the finest possible care of them in another sense, however, for most of their food had to be chewed vigorously; they have lived on bread, a little stale, have often eaten the crusts of it, and their modes of cooking have never done away with the necessity of chewing starchy substances. Chewing produces the best possible cleansing of the mouth, and when we know the habits of the Egyptians with regard to chewing vigorously, it is not surprising to find that though all kinds of disease are noted, oral diseases were much less common among them than they are in the present day. The British rulers, finding that modern Egyptians have not as good teeth as had their ancestors of long ago, have suggested that a modification of the diet might be useful, and have even ventured to suggest that the British at home might very well take a lesson in this matter, and preserve the teeth of the nation by a change in modes of cooking that would be followed by less danger to the teeth than are our present-day methods.

Dental prescriptions of the Egyptians. A certain number of the prescriptions in the Ebers papyrus are meant for ailments of the teeth. This is not surprising, for it contains remedies for nearly every form of disease that we know, and all sorts of drugs. In discussing "Druggist Problems, Old and New," before the New York Branch of the American Pharmaceutical Association last winter, I called attention to the fact that the apothecaries of old Egypt might very well make as many complaints as do the druggists of our day with regard to the necessity for carrying a large stock of very varied drugs. Altogether, over seven hundred drugs of different kinds are mentioned in the papyrus, and they were to be used in every way in which we now use drugs, and elegant prescribing was a special feature, at least at the time of the papyrus itself. While the papyrus was written about 1600 B.C., there are incorporated in it medical writings of much older time, some of them dating from at least 1000, and a few perhaps even 2000 years before the papyrus itself was written. Knowing this, and the wonderful development of all the arts and crafts which was reached in Egypt, it would be surprising if they had not invented artificial apparatus to replace lost teeth. Dentistry has always taken advantage of the mechanical skill of each succeeding generation for its own purpose. The Egyptians made beautiful jewelry, and worked the metals exquisitely. The reason why we have no artificial dental apparatus from them, then, is very probably that it was contrary to their religion to bury things with the bodies of their dead.

DENTISTRY AMONG THE PHŒNICIANS.

Passing the Egyptians, with regard to whom information is uncertain, we come to the Phœnicians, a Semitic people who flourished about 1500 B.C. One of their famous cities was Sidon. Dr. Galliardot, while making some excavations in connection with Renan, found a specimen, now in the Louvre at Paris, which consists of—"Part of the upper jaw of a woman with the two canines and the four incisors united together with gold wire; two of the incisors would appear to belong to another individual, and to have been applied as substitutes for lost teeth." This piece was discovered in one of the most ancient tombs of the necropolis, and seems to show that the replacement of lost teeth by an artificial prosthesis was common considerably more than 1000 years B.C.

CHINESE DENTISTRY.

There are many evidences among the Chinese of various treatments for the teeth, but in spite of their reputation for inventive genius, by which they probably anticipated printing with movable type, the compass, gunpowder, and many other contrivances, they seem to have made no progress in the artificial replacement of lost teeth.

DENTISTRY AMONG THE ETRUSCANS.

Probably the most interesting very early specimen of dental work that we possess is one discovered in an old Etruscan tomb. This consists of a piece of bridge work by which a tooth was fastened between two others, and evidently not only accomplished the purpose of filling up the gap, but also was useful for purposes of mastication. To most people it would be a surprise to hear that anything like this should have been found among a people of whom we know comparatively so little. Every new discovery made with regard to the Etruscans, however, has shown us that there existed in Italy, before Rome was founded, a race of people who had reached a very high stage of intellectual and cultural development, especially in the arts and crafts. The jewelry found in the tombs in the central portion of Italy, the pottery and its decorations, the other remains that are gradually being brought to light, all point to a high state of civilization. So far we know nothing about their literature, because the inscriptions remain untranslated, and no key to their language has been found. Doubtless, however, these inscriptions will before long be deciphered, and then a great new chapter will be added to history. As it is, there is no doubt that a great people there lived and flourished, and then passed away and were forgotten during the early centuries of the Roman republic.

Perhaps nothing shows better how uncertain human history may be than the fact that the existence of this wonderful people, almost equal to the Greeks in their culture, has been hidden from us until recent years. Most of us who read the story of Coriolanus are rather prone to rejoice over the fact that his mother's pleadings and his wife's prayers did not remain unheeded, and that as a consequence the Volsci, who were one of the peoples of old Etruria whom we now know as Etruscans, did not capture Rome, though, had Coriolanus continued in the leadership, they would surely have done so. We do not realize that at the time this happened the Volsci were far above the Romans in culture and in civilization—and, indeed, the Romans were only a barbaric people bent on war and conquest, caring nothing for the arts or intellectual life. The same was true of Carthage. When the Roman army conquered Carthage, the African city was a "city beautiful," while Rome itself was scarcely more than a collection of rude huts. When we know more about the Etruscans we shall appreciate better how wrong were our previous views of them, and how many discoveries such as that I have described with regard to bridge work may have been made by them.

A whole series of appliances and apparatus for the support of false teeth have been found in Etruscan tombs. The civic museum at Corneto contains a number of them. There is bridge work of all kinds, teeth supported by bands, and wired and ridged together, the metal being usually gold, so that the work must have been rather lasting. Knowing what we do of Etruscan jewelry, we are not surprised to find that the dentists used gold and silver, particularly gold, so successfully in the mouth. Some Etruscan necklaces and bracelets show the most exquisite metal work. Thousands of small rings are joined together in order to make a beautiful piece of jewelry. Unfortunately cremations were very common among these people, and so most of the bodies were destroyed. They seem even to have had tooth crowns and to have anticipated nearly every form of modern dental processes.

I once called attention to the fact that the country in which the Etruscans lived has had four great art periods—one about 700 years before Christ; one about the time of Christ, when the beautiful temple of Minerva at Assisi was erected; one in St. Francis' time—for Assisi lies in the heart of the Etruscan country, and one in Raphael's time, for he was taught at Perugia by his great master Perugino. I once proposed that a millionaire should bring over to America some shiploads of the earth from that country in order to have Americans grow up on it, in the hope that they might do some of the wonderful work that has been done there at various periods.

DENTISTRY AMONG THE ROMANS.

While we do not find many remains of advanced dental work among the Romans, there are traces of their having been influenced by the Etruscans. As early as the time of the Twelve Tables, the original laws of the Romans, there is one very interesting expression occurring among those laws: "If a person's teeth have been bound together with gold, it shall not be unlawful to bury the body with it." Gold was rather rare in the neighborhood of Rome, and very precious. There were certain laws requiring that only a very small amount of gold jewelry should be buried with people. Indeed, at one time such burial was entirely forbidden; an exception is made, however, for gold in the mouths of the dead. Except for this law we know nothing about the use of artificial dentures in the mouth at this time. These tables were compiled about 500 B.C. A rather interesting theory might be evolved from this fact, but I prefer to leave that to you.

A little after the time of Christ we

have definite evidence of the use of artificial teeth among the Romans, but it comes to us not, as we might expect, from some scientific record, but from the satiric poet Martial. In one of his epigrams, he says:

> Thais has teeth so black; Lucania white.
> Seek you the cause? Lucania's teeth are bought,
> While Thais wears her own.

We find other references in Martial that are of the same character. It is he who offers the original of that joke with regard to women's hair which is often repeated in modern times. Because Chryseis' hair is so black in spite of her years, someone accuses her of dyeing it, but Martial says that he knows that she does not dye her tresses black for she buys them black. Curiously enough, it is from him that we have the only convincing bit of evidence with regard to the teaching of medicine at the bedside. In one of his satiric poems, he hears a rich patient complain that he will not send for a particular physician, because the crowd of students who come with their cold hands to paw him all over give him a chill.

It is only by collating all such references that we are able to gather details for the history of medicine.

GREEK DENTISTRY.

Though we have been inclined to think a good deal of the Romans, their literature, their art, and above all their arts and crafts, were all borrowed from the Greeks. At best they were merely good imitations of Greek work. It is not surprising, then, to find comparatively little interest in dentistry in the early days in Rome. After the foundation of the empire, however, Greek physicians came to Rome, and they brought some dentistry as well as medicine with them. We find much more about treatment for aching teeth than about professional skill for their preservation. I read a paper before the joint meeting of the Medical Society of the County of New York and the New York Branch of the American Pharmaceutical Association, a month ago, on "Prescriptions, Old and New." I called particular attention to the fact that a great many of our prescriptions and formulæ for treatment were much older than we thought. For instance, the ordinary cough medicine consisting of honey, tar, hoarhound, and some aromatic was in common use in Galen's time—about one thousand eight hundred years ago—and as he quotes it from someone else, it seems to have been employed for a considerable period before. With that in mind, it is easier to understand the occurrence of the employment of a gum for the treatment of aching teeth. This was not made particularly for aching teeth, but was an anodyne or pain-killer for many painful conditions, headache, stomachache, and other pains. It was suggested, however, that it might be used in the form of a gum for aching teeth. We are likely to think that this idea of toothache gum is a modern invention. It was, however, known in the old Roman days. The ingredients render it reasonably clear that it was probably rather efficient. It contained pepper, saffron, the juice of the poppy—that is, crude opium—croton, carrot-seed, anise-seed, and parsley-seed. The poppy juice was dissolved in wine, allowed to dry, then ground, sifted, mixed with the other ingredients and pressed into pastils, portions of which were then inserted into the cavities of aching teeth.

The more we know about the medicine of this old time, the more we admire it. Galen, who recommends this valuable prescription, anticipated many of our modern ideas. For instance, he insisted that for consumption the best treatment is rest, with an abundance of fresh air and of nourishment. He thought that the best forms of nourishment were eggs and milk. He was quite sure that medicines did very little good, and that the men who gave them only abused their patients' stomachs, while many who recommended medicines only wanted to make money out of the poor consumptives. You see how very old the newest thoughts in medicine are!

THE MIDDLE AGES.

After the time of the Greeks and the Romans, most of us are inclined to think that nothing at all was accomplished in any scientific department, in education, or any other branch of knowledge. The middle ages are supposed to have been so dark and backward that it is scarcely worth while to take any account thereof in all that concerns the history of human development. We have come in recent years, however, to realize that at all times during the middle ages men were much more interested in all the scientific problems than we have been inclined to think, and that in the later middle ages, from the thirteenth to the fifteenth century, they accomplished some marvelous feats. It was these centuries that built the universities, the great cathedrals, the town-halls, and the castles that still command the admiration of visitors in Europe. It is they who made the universities what they continue to be to the present time, and there were more students in attendance at the universities at the end of the thirteenth century in proportion to the population of Europe than there have been in universities at any time since, even including our own. This is a startling assertion, but the more we know about that period of the history of education, the more do we realize that this assertion is literally true.

The medieval medical schools. The medical schools of the universities were important departments that reached a high development. According to the laws of the thirteenth century, medical students were required to study in the university itself for three years before taking up medicine, then to study medicine for four years before receiving their degree of doctor, and then were required to practice with a physician for a year before being allowed to practice independently. There was an added feature of the law which is very interesting, requiring students to make a special study of anatomy for a year if they were going to practice surgery. It would be easy to think that in spite of these severe regulations of medical education, to which we are only just beginning to get back, the men of that time were little learned in medicine. Those generations, however, did much for the recognition of disease, for the regulation of the use of opium, for the practical application of rules of diet, of bathing, and even of light as therapeutic agents. One practitioner at Montpellier insisted that smallpox patients recovered much sooner in rooms hung with red curtains, the doors and windows also being covered with red. Finsen received the Nobel prize for the same discovery at the end of the nineteenth century.

Remarkable feats of surgery. It was in surgery, however, that these medical schools did their best work. We have been accustomed to think that surgery is entirely a modern development. We have the text-books of the great surgeons of the thirteenth and fourteenth centuries, who anticipated nearly everything that we are doing in this modern age. They opened the skull for tumor and for abscess, operated on the thorax for various pathological conditions; operated within the abdomen, especially for wounds of the intestines, and did many operations for hernia. I have an old picture showing that they did their operations for hernia in an exaggerated Trendelenburg position. One of these great surgeons said that more patients were operated on for hernia for the benefit of the surgeon's pocket than with a desire to cure the patient. That shows how old even this newest observation is. It might be objected that they could not have done such operations without anesthesia, but they actually had three forms of anesthesia, one by means of an inhalant, though we do not know exactly the nature of the substance employed. It might be said that operations done at this time must have been invariably fatal, because of septic conditions. They used wine in dressing their wounds, however, and produced healing by first intention, and it is to them that we owe this expression.

GIOVANNI ARCOLI.

These men, of course, did for dentistry as much as for other forms of surgery.

Without dwelling on this phase I wish to speak of a man who was born at the beginning of the fifteenth century, and in whose works a good deal of our modern dentistry is anticipated. This was Giovanni Arcoli, a professor at Bologna and afterward at Padua, who about the middle of the fifteenth century wrote, as a commentary on Rhazes, an Arabian medical writer of the ninth century, a series of wonderful chapters with regard to diseases of the teeth.

Oral hygiene rules. He gives a set of rules, for instance, for the preservation of the teeth, that show how well he understood how caries is brought about. He thought that the first cause of decay of the teeth was poor digestion, therefore all indigestible food must be avoided. Everything that might provoke vomiting must also be avoided, and sweet and viscous food, preserves, honey, figs, or dried fruits must not be partaken of. Hard substances must not be broken with the teeth. All food that sets the teeth on edge or that is too hot or too cold—especially in rapid variation—must be avoided. The teeth must be cleaned at once after every meal, and especially all particles between the teeth must be removed. The mouth should be rinsed every day with various drugs, such as sage, rosemary, or juniper seeds. The teeth must be rubbed before going to bed and before breakfast every morning. No modern dentist would ask much more than that.

Extractions. Arculanus—he is often called by his Latin name—describes and differentiates very carefully the various forms of painful conditions of the teeth. He describes various dental instruments for extracting. In one of them, a pelican, as it is called, leverage is used for tooth extraction. The dental forceps recommended by him are very much of the same shape as modern dental forceps. A long thin pair of forceps called a "stork's-bill," also described by him, was used for extracting broken root-portions of teeth. Teeth, however, were only to be extracted for one of three indications—first, when the pain resists every other means of cure; second, when there is any danger of disease spreading to the neighboring healthy teeth, and third, when the tooth causes trouble in speaking and in masticating. If hemorrhage continues after the extraction of a tooth, he recommends alum, extract of gall-nuts, lime, and arsenic, but as the surest remedy the red-hot iron.

Gold fillings. Arculanus is most interesting to us, because he is the first who mentions explicitly the use of gold in filling teeth. Celsus in the Roman period had discussed the use of lead for fillings, also the use of iron, which he condemns. He also discussed the use of gold wire for fastening loose teeth, but did not speak of gold fillings.

At the end of the paragraph in which he discusses the question of the occurrence of cavities in teeth, Arculanus suggests that when the teeth seem of reasonably good color, they may be filled with leaves of gold. This is the only sentence, and he has nothing further to say. He is evidently not referring to something new, but, on the contrary, is only touching upon something that was well known before, and therefore he does not dwell on it. As Guerini in his "History of Dentistry" says: "We must therefore hold that gold filling had already been in use for a long time among dentists, and that Arculanus simply mentions what was done by the dentists of those days."

Implantation of teeth. After this, the most interesting feature is the implantation of teeth, which we find hinted at in a number of the early authors, but explicitly described by Ambroise Paré, who tells the story of a lady who lost a tooth and had one taken from a slave and implanted in her own gum, where it grew firmly. He confesses that he had learned of this only from hearsay, but that the story seems true. Paré lived in the second half of the sixteenth century, the era of the great anatomists whose names are best known—Vesalius, Columbus, Eustachius; all of these men taught us various facts about the teeth.

EUSTACHIUS BARTOLOMMEO.

Eustachius particularly, who like Columbus was a teacher in the Roman medical school, made a number of interesting investigations on the mouth, and published a book on the teeth in 1563. He seems to have recognized even something of the analogy between the nails and the teeth, and his patient researches on men and animals, on corpses, on adult subjects, on children of every age, on stillborn children, and on abortive fetuses enabled him to lay down scientific principles with regard to the teeth. He studied with particular accuracy the crowns and roots of the teeth, with all the variations in number, form, and length. So far as the macroscopic anatomy of the teeth was concerned, very little was left to be done after his time.

LEEUWENHOEK'S MICROSCOPICAL STUDIES.

Toward the end of the following century the microscope was discovered, and Leeuwenhoek, in 1678, used this instrument and described the tubular character of dentin. He stated that 600 or 700 of these little tubes in the teeth might be no larger than a single hair of a beard. His beautifully accurate work, however, attracted no attention. People thought that he was just foolishly occupying himself with illusory matters presented by his microscope.

PIERRE FAUCHARD.

In 1700 France instituted special examinations for dentists. That was the beginning of scientific dentistry in the modern sense of the term. Geniuses before that time, however, had risen on many occasions to see the truths of dentistry, theoretic as well as practical. Shortly after this, in 1723, Fauchard published in Paris his book, "The French Dentist," in two parts. He discusses nearly everything that the modern dentist is able to do. For filling teeth he used lead and tin, but preferred the tin, because the lead blackens. Gold may be used, but it is expensive, he says, and tin is just as good, unless the patient specially desires gold. He talks about pivot teeth, discusses the various kinds of artificial teeth suitable for various types of patients, and gives explicit directions for transplanting teeth. In a word, he inaugurates the modern era of dentistry. It was a full century after his time, however, before our American dentists gradually developed their great mechanical skill, still further revolutionizing dentistry, but above all rendering the best of dentistry available for all those needing it. Before that time a few might have had such service through the genius of dentists, but now good dentistry, thanks to American enterprise, is an art easily learned, and though requiring skill and knowledge, is easily practiced, for the benefit of all the people, poor as well as rich.

Discussion.

Dr. D. B. WILLIAMS, Wilkes-Barre. It is with much trepidation that I take up the discussion of a subject presented by one so prominent in the medical and scientific world. Full of admiration for the speaker who has given so much time to research for his material, I will venture to give expression to a few thoughts inspired by the reading of his paper, but more especially inspired, however, by the conviction that most that is good and all that is scientific in dentistry is the achievement of the dentist of today.

First of all, I might mention the very fact of Dr. Walsh's presence at this meeting. Is not the dentist rapidly being rewarded for his efforts toward developing a highly scientific and professional standard by just such privileges as we have just now enjoyed? There was a time when the man of medicine, especially when one had attained the prominence of our essayist, would have paused long and doubtfully before accepting an invitation to speak before a dental body, and I have no better evidence to offer as a sign of the change in the attitude of that great profession toward dentistry than the presence of Dr. Walsh.

It is true that much of the substance of dentistry, and of medicine also, was known and used long before the Christian era. Time only could tell the story of the various steps in the development of the knowledge of physiology and therapeutics. But the glory of modern dentistry and of medicine lies in the evolvement of a technique now fast approaching the state of perfection, and in the development of the great new science of pathology, representing a foundation for the application of healing mediums, which will, in time, eliminate the great amount of what might be called "speculative treatment" in both sciences.

While a certain amount of the substance of dental practice has maintained its position through the years, for purely physical reasons, there is as much difference between the methods of the dentist of today and those of the dentist of sixty years ago as exists between the precise mathematical methods of the modern chemist and the superstitious puddling and stirring of the alchemist of the middle ages.

The modern dentist smiles as compassionately upon the crude efforts of his Etruscan predecessor as does the masterful surgeon of today when he reads of the tender ministrations of one Gil Blas de Santillane to his hapless victims.

I would not have the essayist think that his remarks have been misinterpreted and misconstrued, for I know his paper is not intended as a reflection upon the dental profession for any imagined lack of progressiveness, but it emphasizes the truth, unwelcome to some perhaps, that dentistry as a science is new, and that as a new science it has made greater strides in its comparatively short life than any other profession can hope to boast of, and the "old" in the "new" dentistry is scarcely to be recognized. The red-hot iron has given way to the less caloric but more effective adrenalin, the dread of the surgical phase of the dentist's work has been vanquished by the discovery of Dr. Horace Wells, anesthesia; cocain is fast banishing the dread of cold steel, and for the future the diagnosis of pathological oral conditions by a study of the etiological factors and correction by proper advice in regard to dietetics is a promise—some say a possibility.

This is an age of prevention with the dentist as well as with the physician, and he has been quick to grasp the significance of that great science, the foundation of which was laid by Louis Pasteur. Scientific dental prophylaxis, the absolutely new science of orthodontia, the establishment of the public dental dispensary, are all new, and indicative of the spirit of progress animating our profession.

These remarks may seem to stray from the theme of the paper, but I wish to emphasize that while the old in dentistry may be sometimes classed as new, the new in the dentistry of today certainly cannot be classed as old.

Dr. A. P. LEE, Philadelphia. I did not receive a copy of the paper until just as I was leaving Philadelphia, for which Dr. Walsh has very magnanimously apologized in his remarks. I shall therefore refrain from discussing it, and I think that I voice the sense of the society when I thank the essayist for his delightful talk.

Dr. R. M. STRATTON, Scranton. The essayist has told us so many wonderful things that if he had told us that Venus had an upper central gold crown with a diamond set in it, or that Mercury always required amalgam fillings in his teeth, I should have believed every word, as I have believed everything he has said to us. I wish to thank him for his delightful lecture.

Dr. WALSH (closing the discussion). I am not trying to make you think less of the work which you are doing now, but we will do our work better if we are not quite so conceited as to think that we are the only ones who ever did it. Then we can keep what we have, realizing all the time how easy it is for advance to get away from us unless we "keep at it." It seems a little pessimistic from one point of view, but it is not with that idea that I have presented this older history of dentistry to you; but we professional men must know these historical facts, which inspire us with respect toward so old a profession. It has been customary to think too little of the men of the past. Real knowledge must include respect for them.

I have one suggestion to offer. We often see pictures in dental offices that are sometimes to the credit of the taste of the dentist, but it is always a problem as to what a professional man shall hang on his walls. You have an opportunity to secure a picture for your offices that is a classic, and which because of circumstances is very suitable for the dentist. It is Rembrandt's "Lesson in Anatomy." Nicolaus Tulpius "the dissector," of that group, is one of the important earlier writers on dental subjects. He was, besides, a distinguished anatomist and physician.

The next order of business was the report of the Committee on the President's Address.

The meeting then adjourned until Thursday morning.

THURSDAY—*Morning Session.*

The meeting was called to order Thursday morning, June 29th, by the president, Dr. Walker.

The first order of business was the report of the Executive Council by Dr. Weaver.

Motion was made and carried that the report be adopted.

Dr. KLUMP moved that the thanks of the society be extended to the hotel management for the courtesies shown the members during the meeting. (Motion carried.)

Dr. BORDNER then presented the following report from the Auditors: "The auditors report that they have examined the accounts of the treasurer and secretary and have found them to be correct."

Motion was made and carried that the report be accepted.

Dr. BROOMELL moved that a vote of thanks be extended the Local Committee for the entertainment furnished the society at the "smoker" on Thursday evening. (Motion carried.)

The next order of business was the installation of the newly-elected officers, after which the newly-elected president, Dr. Fundenberg, declared the meeting adjourned until the next annual session.

DENTAL SOCIETY OF THE STATE OF NEW YORK.

Forty-third Annual Meeting.

(Continued from vol. liii, page 1449.)

SECOND DAY—*Afternoon Session.*

(Continued.)

The next order of business was the reading of a paper by Dr. F. H. SKINNER, Chicago, Ill., entitled "Pyorrhea and Prophylaxis."

[This paper is printed in full at page 39 of the present issue of the COSMOS.]

Discussion.

Dr. R. G. HUTCHINSON, Jr., New York. As there is not enough time at our disposal for an extensive discussion of this interesting paper, I will touch on only a few points.

In the essentials I agree with the essayist in his views as to the subject and its treatment, but there are some points on which I disagree. The subject of the etiology of pyorrhea is one that I think we had better let alone in all future discussions before societies, and especially before societies of a mixed order. We will have to fight that out among ourselves. In the past there has been a great deal of harm done in discussing this subject before our societies, because many have reached the conclusion from such discussions that this disease cannot be cured, and that therefore there is no need of paying any attention to it. Those, however, who have made a study of this affection, while they disagree in some particulars, are in harmony in regard to the essential points, the only difference being that they have reached different conclusions from the same demonstrated facts. Those facts have been demonstrated by clinical experience and observation, and demand that a definite method of treatment be employed. As I said, in the past many have been discouraged by a false conception of the subject gathered from the discussions and wranglings which have gone on in regard to the etiology of pyorrhea. They have concluded that if pyorrhea is constitutional it is incurable, and that it is useless to attempt to treat it. Many have attempted treatment but because of their inexperience have failed to achieve satisfactory results, and have declared this disease to be incurable. The presence of salivary calculus does not in my opinion necessarily result in pyorrhea. It does sometimes, but its mere presence and constant increase in bulk causes only a physiological loss of tissue by resorption. If the presence of salivary calculus causes the accumulation of putrefactive matter around the tissues, these become hyperemic and break down, succumbing to the attack of pathogenic bacteria, and so may result in pyorrhea. It has been my experience that pyorrhea occurs most frequently around teeth that are not subject to the accumulation of salivary calculus. The foundation of pyorrhea, as of caries, I think is laid in early childhood or youth. There may be exceptions, but I speak of the rule, and of the kind of cases many practitioners have regarded as incurable, while in reality all those who have given consideration to this subject agree that they are curable. The inception undoubtedly takes place in early life, the disease progressing by slow degrees until it reaches its culmination in later life. Irritation takes place, the extent of the destruction of the tissue depending on constitutional resistance very largely, as well as on calculus. Faulty metabolism I believe is not the cause, except in some cases where it may facilitate the progress of the disease, yet often, though faulty metabolism and toxemia of a general character be present, we can cure most cases of pyorrhea. In many cases, in fact I think always, a considerable amount of toxic matter is present locally, bringing about the destruction of the tissues. Dr. Black has been alluded to as stating that the formation of calculus was the result of improper diet or mastication; the conclusion was that the presence of calcic material in the saliva is the result of improper mastication or diet. The conclusion I would reach would be that imperfect mastication or improper diet results in greater bacterial activity in the oral cavity. We know that in case of indigestion the tongue and the whole oral cavity is alive with bacteria, and I think the formation of calculus is due more to increased bacterial activity than to increase in the amount of calcium salts in the saliva.

The dry pyorrhea which the essayist refers to I believe to be due simply to a lowered state of nutrition, in which the tissues are all very susceptible to injury. Such injury may be produced mechanically or bacterially, and a general thorough curetment of such surfaces, involving removal of the pathological tissues and stimulation of the tissues, will surely result in an arrest of the destructive process.

That pyorrhea is undoubtedly the cause of many systemic troubles I have demonstrated in former discussions of this subject.

The treatment does not consist in instrumentation alone. This is the most difficult and important part, as instrumentation requires more skill and practice than any other form of treatment; but we must remember that in the majority of cases some local injury has been inflicted, maybe by malocclusion or any one of the many causes mentioned by the essayist. These causes must be eliminated, especially if it be malocclusion, which must not necessarily be general, but may be localized. As soon as the tissues are injured by strain or pressure, susceptibility will be established at that point, and mere instrumentation, while of paramount importance, is not enough to effect a cure or prevent recurrence of the disease. Cure by extraction is always effectual unless, as the essayist says, there is an involvement of the bony tissues; then I consider the disease to be beyond the stage of pyorrhea. If the bone tissue is involved as the result of pyorrhea, we must also remove the cause and the products of the disease.

During the operation it is quite important that free hemorrhage should be produced, for the surrounding tissues are filled with toxic matter, and there is a sluggish capillary circulation. Under these conditions the blood in the capillaries is filled with toxins, and the tissue is being deprived of the nutrient material necessary for its upbuilding, so that a free hemorrhage during the operation is very essential for flushing out the stagnant blood and bringing about a restoration of the wounded parts. After the operation the wound should be protected. I do not believe in medication in the strictest sense of the word. The treatment of pyorrhea is surgical, and it is necessary to remove the pathological tissue and protect the living tissues so that they will be restored to normal conditions. We must also take into consideration our inability to dress such a wound as it is done in general surgery. The wound is exposed to decomposing material constantly, and for that reason we must take precautions to remove that matter. We should also use such preparations during the process of healing as will inhibit bacterial growth in order to prevent reinfection of the tissues.

It is not my practice to polish teeth as the work progresses. In my hands no one method has been universally satisfactory, and I have been unable to lay down any hard-and-fast rule as to the method of procedure in instrumentation. If an aggravated condition exists in a mouth that has been neglected and where a profuse flow of pus and large accumulations of serumal calculus are present, my experience has proved that it is better to remove the greater part of the irritating matter so as to improve at once the general condition as much as possible, and later on to treat each tooth as thoroughly as circumstances indicate. Each individual case must be treated as an individual case. All the conditions entering into consideration must be taken into account, and treated individually, as the physician treats an individual in medication. Polishing I think can be dispensed with until the final sitting. I prefer the use of pyorrhea instruments rather than to introduce pumice on a stick. The débris removed from the teeth is liable to become embedded under the gums, and the difficulties continue unless this is cleaned out thoroughly. The method most efficacious in my practice has been spraying with compressed air and hydrogen dioxid, followed by a mild antiseptic solution.

I polish the teeth with the engine. It is quite possible—in fact, I believe it often is done—to injure the gums by polishing the teeth with the engine. If brush wheels are used this is very apt to be the case. If rubber polishers are used which are not flexible and have thin edges, injury will be done to the tissues. These polishers should be revolved not too rapidly, with a little pressure, and kept moist; the cervical portion of the teeth can be polished with the proper form of rubber cups, the distal portions with saucer-shaped disks, followed with floss.

I cannot approve of the use of points and instruments by the patient, except under extraordinary circumstances. I would not like to undertake to treat my own mouth, and I could not expect a patient to do it. It may be that Dr. Skinner has the faculty of instructing his patients in such a way as to be productive of good results, but I should not like to advocate such a measure.

Prophylaxis during pregnancy is of great importance. We know of course that during this period there is a much greater tendency in all the tissues to succumb to infection and break down, requiring extraordinary care during that period.

The fees charged for this work should be ample. No service is more beneficial to the patient than the treatment of pyorrhea and prophylaxis in general, and while the fee must be determined by each practitioner himself, I think that he is justified in charging one that will properly remunerate him, and it is hardly possible to charge too much. Personally, I advocate the regulation of fees according to the ability of patients to pay for the work.

The frequency of prophylactic treatment must be determined by the circumstances in each case. After we have effected a restoration to health, I do not consider it necessary, except in rare cases, to conduct a monthly prophylactic treatment. It is wise to have the patients report to ascertain whether they are carrying out our instructions, and to determine whether or not we have failed in our efforts to remove the pathological tissue and restore health. My experience has proved that one treatment every three months is ample, as a rule, and sometimes patients have been treated but once in two years. Each case must be a law unto itself; each must be kept under observation.

Dr. W. W. Smith, Rochester, N. Y. Dr. Skinner evidently knows how it feels to have a clean mouth, and he also thoroughly comprehends the preventive value of a clean mouth to the teeth and its beneficial effect on adjacent organs and the general system—otherwise his statements of results would be assailable. To effectually create and maintain such ideal conditions as are advocated in the paper means a work for humanity such as is surpassed by no other.

The essayist suggests that we should recognize lesions inflicted upon the parts adjacent to the mouth and teeth, and refer them to the proper specialists. This is as important as our interest in the general physical condition of the patient. Other specialists and general practitioners of medicine are more and more coming to consider mouth conditions in their diagnosis and treatment of disease, as well as in their prophylactic work.

We know that to a great extent faulty metabolism, stomach or intestinal indigestion, and other troubles can be influenced or corrected by proper mastication and deglutition of food if associated with proper mental conditions. It is within our province to disseminate such knowledge, as we have opportunities therefor such as are not offered to the general practitioner.

I will not attempt to enter into any argument as to the causes of caries of the teeth or to what extent general conditions influence it, or to what extent bad mouth conditions influence or cause general pathological conditions, but I am surely voicing the experience of most of the older dentists by saying that we are at times humiliated by our utter helplessness in cases in which we have devoted our very best efforts to maintain perfect mouth conditions, yet in which an onset of caries will occur, the ravages of which we are not able to prevent by any local treatment.

We have yet much to learn about this subject. This is not an argument against the principles of prophylaxis which have been so comprehensively expressed in the paper, but a plea for a broader knowledge of the relation of cause and effect.

Dr. Skinner's procedure of practice and instruction to the patients seems exceptionally practical. The iodin "disclosing solution" appeals to me, and I shall try it, heretofore having used simple tincture of iodin. The filling of the fissures in molars and bicuspids with cement as soon as these teeth have erupted is worthy of our consideration; others have employed this measure, and claim good results therefrom.

I differ from the essayist in regard to the texture of the bristles in toothbrushes. I prefer a hard brush, as a little brushing with it is more effectual than much more brushing with a medium or soft brush, the bristles of which bend so easily and do not cleanse the teeth effectually; if the hard brush is properly used, it need not cause any harm.

Dr. McDonagh of Toronto, a pyorrhea specialist, recently said that the floss silk, as it is generally used, did a great deal toward making business for him. It seems to me to be a very valuable adjunct to the dental toilet, but we should instruct our patients very carefully how to use it so as not to injure the gums and pericementum, thereby setting up an inflammation which may favor the trouble we are trying to prevent.

If a practitioner is discreet in selecting his patients and careful in instructing them—as Dr. Skinner undoubtedly is—the practice of giving them scalers for personal use and porte-polishers for general use may be advantageous; but this should be done with caution, else injurious results may be expected. I have used the 10 per cent. solution of silver nitrate as recommended in the paper quite extensively, with satisfactory results.

Supplementary to the excellent teaching contained in the paper, I should say that mothers, nurses, and children should be impressed with the importance of having the child use his teeth as soon as they have erupted. They should be taught that the proper use of the teeth, that is, the thorough chewing of hard food, develops children's jaws and prevents irregularities of the teeth, also develops the teeth themselves, and more effectively prevents future caries of the teeth and pyorrhea than any other procedure.

I wish to indorse heartily the essayist's remarks in regard to instruction in oral hygiene in dental colleges, making it a necessary qualification for graduation that the student maintain proper mouth conditions, for, as the paper states, a practitioner's argument with his patients lacks in force if he does not know from personal experience the value of oral hygiene. This subject has been advocated recently, and it is encouraging to read pointed arguments in its favor.

I trust that this paper will receive the careful consideration which it deserves, and that it will arouse renewed interest in this most important subject of today.

Dr. P. R. STILLMAN, New York. It would not be possible for me to add anything to Dr. Skinner's excellent paper, for it embodies my own views, and relates many of my own observations most clearly and concisely.

For thirty years past our literature has been laden with almost countless essays and papers dealing with this formidable disease. More has been written on this subject than on any other one phase of dental science, and despair and discouragement have been the keynote of most of these learned treatises. There is still wide speculation among us as to the underlying etiological factor, and it is only during the last five years that any hopeful note has been heard.

Dr. Skinner's paper, and the recent essays of Dr. Hutchinson and Dr. Rhein of New York, Dr. Spalding of Detroit, Dr. G. V. Black and Dr. Buckley of Chicago, as well as others, teach us that in order to succeed in the treatment of pyorrhea great skill in technique is essential, and long and persistent application is necessary.

My own experience and observation confirms the essayist's contention that no known systemic treatment has been successful, while the careful removal of all deposits, visible and invisible, from the roots of the teeth, followed by systematic oral prophylaxis, has in a very large percentage of cases produced a complete and permanent cure.

Our patients' constantly increasing demand for this work, once its possibilities are understood, is astounding. Show them their own mouths, reeking with filth, effluvia, pus, and countless bacteria-breeding pockets, and then, after a few treatments, demonstrate to them the transformation from the pathological to the normal, the mouth clean, the gums gradually assuming that roseate hue which perfect health and oral cleanliness alone impart. The grateful appreciation of such effort is sufficient encouragement to the practitioners who are criticized for their too great enthusiasm.

It is to the young practitioners that we must look for the application of these principles, and it is from their ranks that the recruits will come. Yesterday there was an awkward squad; today we have almost a regiment, but tomorrow there will be an army, trained and triumphant.

Dr. W. A. Price, Cleveland, Ohio. I want to emphasize one of the essayist's remarks, namely, the importance of early treatment. Dr. Hutchinson suggested in regard to fees that it was our duty to get all we could! I wish to know how he can ascertain how much a patient possesses. I remember a case where a specialist sent his bill to a patient for seven hundred dollars; the patient returned the bill saying that the specialist had made a mistake, as he had more money than that.

But, joking aside, the serious phase of the problem to me is not so much the cure as the prevention of pyorrhea. The fact remains, as the essayist said, that the disease is most acute in adults, but it has its beginning in youth, and the question is, How can we prevent it? In my opinion we can do very much toward the prevention of pyorrhea. If you have followed the bacteriological investigations of Metchnikoff, Crile, and others, particularly as to cell degeneration, you must have been struck with the fact that the same law holds true in pyorrhea as in all other cases of cell degeneration of the body, namely, that the health and resistance of the cell stands almost in direct proportion to its nutrition. This problem resolves itself, then, not into a discussion of its etiology, but of nutrition, the chief aim to be the increase of the nutrition of the vital tissues. Several years ago I had the pleasure of examining in the museum at Colorado Springs a number of skulls which had been taken from the caves of the cliff-dwellers, and there was not a single instance of caries in any tooth in any skull of that collection, nor any indication of pyorrhea or absorption of the alveolar process. The cause for these phenomena is found in the splendid circulation those people enjoyed, which in turn was due to their mode of mastication and living. We cannot bring about in our young people the same kind of stimulation, but we can place in their minds and hands a method that will greatly assist mastication and that exercise which the gums need for more perfect circulation.

The day before I started for this meeting a gentleman who had recently returned from the South came to me for prophylactic treatment. He said that on his way home he had stopped in Washington, where a friend had told him that his wife had been troubled with her teeth and gums in the same way as this patient, and that he would recommend to him the same remedy which his wife had received from her dentist. He adopted the method suggested, and said that during his two weeks' sojourn the hemorrhage from his gums ceased entirely, whereas upon his arrival in Washington there had been a continual hemorrhage. What the dentist had advised the woman was to purchase a bottle of campho-phénique and to rub her gums vigorously with this for five minutes every day to increase the circulation. I grant that this massaging of the gums while calcareous deposits were underneath them was unfortunate from the standpoint of ideal treatment. The deposits should have been removed first, and the massage then instituted. But even without this, the patient received much benefit. Today I am teaching children the value of gum massage, and in my opinion as much benefit is to be derived from this procedure as from the cleaning of the teeth.

Dr. L. C. LeRoy, New York. I should like to emphasize two points which occurred to me while the essayist was reading his paper; first, the filling of the fissures in the teeth of young people with some cement, which the essayist has duly accentuated. I have found this practice to be of inestimable value, after having it demonstrated first on my own children years ago. When Dr. Ames' copper phosphate cement was first introduced in the market, it occurred to me that it would be of value in filling fissures in molars, and that these teeth would not decay if treated in this way in early childhood. I adopted this method in my practice generally, and the results have been far more than satisfying.

The other point in Dr. Skinner's paper which I wish to speak of is the polishing of the roots of teeth in prophylactic work. I believe, as Dr. Hutchinson said, that the introduction of foreign material such as pumice into these pockets will do considerable damage, unless it is thoroughly removed afterward. It does not seem to be generally known that we cannot protect granular tissue too well from any subsequent irritation or injury, and it is incomprehensible to me that that essayist should again enter these pockets with polishing sticks and pumice. The porte-polisher is an indispensable instrument, but not for carrying pumice into pyorrheal pockets. After the surgical treatment of such pockets the root surfaces are left more or less scarred by the cutting instrument. It has been thought sufficient in the past to leave these surfaces in this condition, probably because of inability to carry the operation farther. I believe, however, that I have advanced one step ahead of the heretofore adopted practice, as follows:

I immediately follow the surgical removal of calculus with a set of burnishing instruments of exactly the same shape as the cutting instruments. These remove all roughness, even in the deepest recesses. It must be conceded that the diseased cementum cannot be rendered too perfectly smooth in view of the highly vascular granular tissue for which we have made all these preparations. As the disease has been caused by an irritant, so the presence of some irritant has thwarted nature's efforts at reconstruction, producing recurrence of the disease. As a final procedure I cleanse all surfaces which can be reached with brushes mounted on the handpiece and wood points in the porte-polisher, using all possible care not to crowd pumice into the pockets, and subsequently flush all recesses with sprays under air pressure. Finally I go over all surfaces with precipitated chalk, and at subsequent prophylactic sittings use chalk in preference to the abrasive.

In the clinics I shall demonstrate the efficacy of a set of my scalers, and shall be able to show the effect of the burnishing instrument following the scaling instrument. In my opinion the use of a burnishing instrument is very essential, and I prefer for this purpose an instrument of the same shape as the scaling instrument, which in fact is the only suitable one. Immediately after the use of the scaling instrument these burnishers are carried also to the ends of the roots or recesses.

Dr. M. L. Rhein, New York. The essayist is to be congratulated on his paper. It is in reference to a subject of this nature that Dr. Flanagan's criticism is of value and pertinent, for it is in the discussion of this subject that the dentist has persistently shown a woful lack of knowledge of pathologic conditions. This is emphasized by Dr. Hutchinson's observation as to the feeling of uncertainty that the discussion of this question produces in the average dentist, which is but an additional argument for the correctness of Dr. Flanagan's remarks in regard to the need of a broader general education for the dentist, if he is to treat this disease. The man who is incapable of appreciating scientific pathology is absolutely unfitted to prescribe what should be done in any case of pyorrhea. It is easy enough to apply well any of the procedures mentioned. The important thing, however, is to do the right thing at the right time. Most dentists use their skill in doing the wrong thing. We must all agree with Dr. Hutchinson that it is unwise to put into the patient's hands instruments for use upon themselves. Serious injuries to the dental tissues result both from poor dental work and the patient's own manipulation. On the other hand, I hasten to come to Dr. Skinner's assistance in regard to polishing roots. The worse the condition of the case which presents itself, the more important it is that the operator should continue his work upon one tooth until it is polished to the end of the exposed root portion; in other words, every vestige of deposit must be removed and the surface polished. It is foolish to contend that the pumice cannot be removed from such a pocket as easily as can any other débris.

I am opposed to the use of hydrogen dioxid by patients in these cases and to a great many of the powerful medicines that have been advocated. Professor Black last winter before the Second District Dental Society strongly emphasized a truth that we cannot get away from—"The more powerful the remedy that you use for antiseptic purposes in the mouth, the more you are going to injure and destroy the protoplasmic germs that you are trying to nourish." This ban applies to no therapeutic agent more especially than to hydrogen dioxid. This should never under ordinary conditions be put into the hands of our patients, and I take this opportunity of decrying the indiscriminate prescribing of hydrogen dioxid for patients who are troubled with pyorrhea. This agent is unfortunately becoming a so-called household remedy, and it is time that dentists realize the harm which they are doing to their patients by prescribing such a medicament.

It is well to emphasize what the essayist has said about the danger of striking the soft tissues with the end of the toothbrush, as well as by imperfect methods of brushing. I have seen much infection caused by improper forms of brushing, and yet such methods of brushing are advocated by men of great prominence.

The most important point of all in this discussion is that no two cases of this disease are alike. Guided by the common sense that Dr. Hutchinson spoke of, we should treat each case according to its individual requirements, and we must therefore first be able to make a correct differential diagnosis. The dental colleges in this country at the present time appear incapable of properly treating this most important of all subjects. So-called common-sense treatment can only be used after a differential diagnosis has been correctly made. When the dental colleges examine their students practically in the presence of infirmary patients and with sufficient frequency and rigor, then there will be some hope of the mass of the profession treating this disease on a scientific basis.

Dr. L. MEISBURGER, Buffalo. Dr. Skinner's paper impressed me like a picture of one of the old masters—it was genuine.

As has already been said, so many theories in regard to this subject have been advanced that practitioners intending to take up this sort of work become confused, and oftentimes discouraged.

I am in thorough accord with the essayist, but was astonished to hear Dr. Hutchinson say that he encourages a rapid and copious flow of blood in treating pyorrhea. I cannot comprehend the necessity or benefit of such treatment.

Dr. Rhein has already spoken of the necessity of polishing the roots of all the teeth involved, of which Dr. Hutchinson does not approve.

Dr. HUTCHINSON. I said that I never polish the roots of teeth with pumice, but burnish them with an instrument. The pumice is applied only to the coronal surfaces of the teeth, as the last step of treatment.

Dr. MEISBURGER. I understood you to say that you did not polish the roots at the first sitting, which to my mind is paramount, because otherwise in a few hours the surfaces are reinfected, and the benefits of the treatment are undone.

Again, I do not agree with Dr. Hutchinson in the use of the rubber cup for polishing teeth, as in my opinion the surfaces cannot be polished properly with this appliance.

Dr. SKINNER (closing the discussion). Several of the gentlemen who have taken part in the discussion have thought the disclosing solution unnecessary. That depends upon whether we want to simply "clean the teeth" or do prophylactic work. To prevent caries all plaques must be removed, and no practitioner can perceive whether a tooth surface is clean without a staining or disclosing solution. We can get teeth esthetically clean without this solution, but we should polish the real surface of the tooth, and this requires a disclosing solution of some kind. The formula I have indicated has proved very satisfactory in my hands, as well as to a number of my friends, and I would lay particular stress upon its use.

Anyone using the disclosing solution will recognize how ineffectual a toothbrush really is, and I have yet to meet the man who is not pleased with the results obtained from teaching his patients how to manipulate a polisher. It is by trial only that doubts can be dispelled. Patients do not injure the gums, not even as much as the dentist sometimes does, because their sense of feeling stops them before that point is reached. The greatest difficulty, in the majority of cases, lies in inducing them to use it enough.

I should have liked to go into greater detail in many items, but the paper is long enough. One of these items, mentioned in the discussion, is the value of rubbing or massaging the gums both with the finger and the brush, but this should be done only after all deposits have been removed, and the necks and roots have been smoothed and polished, because rubbing the gums overlying rough tooth surfaces only cuts and lacerates the tender tissue, and renders it more liable to infection and subsequent destruction.

By the frequent use of the polisher the necks of the teeth are kept clean, and by this means a great quantity of infectious deposit, which usually finds a lodging-place at the cervical margins and in the interproximal spaces, is removed. These can be located only with a disclosing solution.

The next order of business was the calling of the roll of members present, by the secretary, Dr. Burkhart.

Election of Officers.

The society then proceeded to the election of officers for the ensuing year, which resulted as follows:

President—Dr. Ellison Hillyer, Brooklyn.
Vice-president—Dr. C. F. Baylis, Oneonta.

Secretary—Dr. A. P. Burkhart, Auburn.
Treasurer—Dr. G. H. Butler, Syracuse.
Correspondent—Dr. E. B. Prentiss, New York.

DENTAL EXAMINERS NOMINATED.

Fourth District—O. J. Gross and W. S. Rose.

Seventh District—W. A. White and B. S. Hert.

LAW COMMITTEE.

Wm. Carr (chairman), W. H. Rogers, A. M. Wright, W. E. Snyder, C. J. Peters, M. D. Jewell, F. W. Proseus, F. A. Ballachey, and W. E. Traver.

LEGISLATIVE COMMITTEE.

L. S. Blatner (chairman), Alex. Currie, F. O. Kraemer, E. B. Rhinehart, W. F. Tremain, W. J. LeSuer, B. S. Hert, H. J. Burkhart, and H. C. McBriar.

EXECUTIVE COUNCIL.

Fourth District—A. C. Rich (for four years).

Third District—J. W. Canaday, Sr. (for four years).

PERMANENT MEMBERS.

First District—Thos. C. Swift, E. B. Prentiss.

Second District—H. C. Croscup, W. G. Lewis.

Third District—S. W. Whitney, George Van Derpool.

Fourth District—R. H. Whitmyre, G. H. Shannon.

Fifth District—A. D. Wells, C. A. Sayers.

Sixth District—F. A. Ford, H. P. Wells.

Seventh District—O. W. Norton, E. J. Sweet.

Eighth District—M. B. Eschelman, J. G. Roberts.

Ninth District—W. E. Traver, E. Cowles.

Dr. H. J. Burkhart. I move you, Mr. President, that when this society adjourns, it be adjourned until the second Thursday in May 1912. (Motion carried.)

Motion was then made and carried to adjourn until the evening session.

Second Day—*Evening Session.*

The meeting was called to order on Friday evening at 8 o'clock, by the president, Dr. Cooke.

The first order of business was the report of the Dental Hygiene Council, by the chairman, Dr. J. O. McCall.

On motion the report was accepted.

The next order of business was the report of the Executive Council, by the secretary, Dr. G. B. Beach.

On motion the report was adopted.

Dr. Hillyer. I regret very much to note the absence of the report of the Necrology Committee, as it so happens that that committee has a very important duty to perform on account of the death of two of our members, Dr. Hurd and Dr. Sanger, and it seems that some provision should be made for including this report in the report of the Executive Council for publication.

Dr. Hillyer then moved that the society honor the two deceased members by a rising vote. (Motion carried.)

REPORT OF THE COMMITTEE ON NECROLOGY.

The Necrology Committee subsequently reported as follows:

Dr. William B. Hurd.

Died, at Manchester, Vt., on April 26, 1911, Dr. William B. Hurd, in the ninety-first year of his age.

Dr. Hurd was born in Brookfield, Conn., on July 5, 1820. For three years he studied dentistry in the office of Dr. David Keys of Danbury in the same state, and in 1852 commenced to practice in the town of Birmingham. In 1857 he removed to Brooklyn, N. Y., where he continued to practice until about ten years ago, when he retired from the active work of his profession.

Throughout his entire career he was one of the most able and influential workers for the advancement of dentistry. He was very much interested in the movement which led to the formation of this society. He was present at its organization, and was elected vice-president, and later became its third president on June 29, 1871. He was the first president of the Second District Dental Society, was president of the Brooklyn Dental Society for several terms, and had also been president of the National Dental Association.

He had a commanding presence, a most patriarchal appearance, was a good presiding officer, and was called upon from time to time during his professional career to fill nearly every office of prominence in dental organizations in his city, in the state, and in the country.

He had a genial disposition and a most happy temperament. He had a host of professional friends, at whose gatherings he was always the center of some interesting group. He will be sadly missed by his many friends and his loving son and daughters, to whom this society tenders its most sincere and profound sympathy.

Dr. Roderick McLean Sanger.

Died, in East Orange, N. J., April 16, 1911, of arterio-sclerosis, in his fifty-sixth year, Roderick McLean Sanger, D.D.S.

* * * * *

[See the June 1911 issue of Dental Cosmos, page 739, for obituary notice of Dr. Sanger.]

Respectfully submitted,

S. G. Perry,
W. S. Rose,
C. S. Butler,
Committee.

PRESENTATION OF THE FELLOWSHIP MEDAL.

The next order of business was the presentation of the following report:

The Committee on Fellowship Members begs to report that after much consideration of the merits of various gentlemen to be made Fellow of our society, on ballot they have unanimously selected Dr. R. R. Andrews of Cambridge, Mass., to receive that honor at the present meeting. The medal has been purchased and is in the hands of the president ready for presentation.

Respectfully submitted,

A. L. Swift,
A. R. Cooke,
W. J. Turner,
S. A. Freeman,
R. H. Hofheinz,
Committee.

Dr. Cooke, in presenting the medal to Dr. R. R. Andrews, Cambridge, Mass., spoke as follows:

Dr. Andrews,—Sir Francis Bacon, in the preface to his essay on the "Maxims of the Law," gave utterance to the following sentiment relative to duties of professional men to their calling: "I hold every man a debtor to his profession, from the which as men do seek to receive countenance and profit, so ought they of duty to endeavor themselves by way of amends to be a help and ornament thereunto."

English literature contains no finer expression of one's obligation to his profession and to his *confrères* than is stated in this brief quotation, with which you are familiar.

It is in recognition of the discharge of this duty that your name has been presented with the recommendation that to you be awarded the Jarvie medal as a token of admission to fellowship in the Dental Society of the State of New York.

To you, Dr. Robert R. Andrews, the dental profession owes a debt of gratitude for your unselfish, untiring efforts to increase the fund of useful knowledge in the important field of dental histology.

As president of this society, it affords me great pleasure to deliver to you this the eighth Jarvie medal, and in so doing to pronounce you a fellow of the Dental Society of the State of New York.

Dr. ANDREWS, in accepting the medal, spoke as follows:

Mr. President and Gentlemen,—This is indeed a proud moment for me—an occasion when words appropriate to express appreciation are apt to run away from one. It is an honor I esteem beyond all others to have had my work recognized thus by the principal state dental society in the Union, and one before which I have never read a paper. You can imagine my surprise when I received notice that this medal was to be awarded to me.

If I have anything to suggest, to the younger members of your society, it will be the fascinations of research work, of trying to find out something new in the structure of tissue. I can recall the time, in 1869, when one of S. S. White's agents came to my office in Cambridge shortly after I had started in practice, and showed me several small microscopes that the firm wished to dispose of. I bought one for three dollars. I had no idea of using it for any special work, but after a time became interested in the structure of the plants growing in my office. The idea occurred to me of trying to find out something of the structure of the tooth. With the instrument at hand there was very little to find out. I did see enough, however, in the tubuli of the teeth to interest me further, but realized that from lack of knowledge as to the preparation of tissue my studies with such an instrument must necessarily be very limited. I found myself desiring a better microscope, and when I could spare the money I bought a new one, paying twenty-five dollars for it, which was a good deal for me to spend at that time. I happened to have a friend in Boston who was investigating the development of the eye and ear, and he kindly offered to give me some of the jaw tissue which he did not need. It took me some time to master the technique of preparing the tissue and of mounting the slides, and then success only showed me the necessity of a still better microscope. I bought one that cost me one hundred and twenty-five dollars, a Zentmayer, with glasses powerful enough to examine all tissues. Then followed the preparation of a series of slides of the jaw together with the teeth, under the guidance of my friend Dr. David Hunt, who was kind enough to supply the tissues and tell me how to prepare them.

I read my first paper on what I saw in the processes of the development of the teeth before the Boston Microscopical Society, in 1871.

The work became so absorbing that I devoted several evenings each week to it, occasionally working till two or three o'clock in the morning. Shortly after this I was fortunate enough to become acquainted with a physician, a genius in his way, who made a section-cutter for me by means of which large numbers of sections could be cut under fluid, and kept moist. One could cut and section a whole jaw with it, or use only those sections which one wished to save.

I was not specially well trained for this work, and it was only my interest in it that made me pursue it. The work was thoroughly enjoyable; there was something inspiring and fascinating about it, and if the younger men would only take up such work, they would never regret it. Here is a splendid opportunity, and I hope some of you will grasp it.

Gentlemen, I thank you beyond words for this gift. I shall hold it very dear. It is the highest honor I have ever had conferred upon me. I am proud of it because it is the Jarvie medal, and I thank you more than I can ever express. [Applause.]

The President then announced as the next item on the program the reading of a paper by Dr. R. R. ANDREWS, Cambridge, Mass., entitled "Calcification."

[This paper is printed in full at page 47 of the present issue of the COSMOS.]

Discussion.

Dr. I. N. BROOMELL, Philadelphia, Pa. It was with a good deal of hesitation that I accepted the invitation to take part in the discussion of this paper. I hesitated chiefly on account of the fact that it would seem presumptuous upon my part to attempt to discuss a subject presented by a writer who has perhaps done more work along this particular line, and who is therefore more fully informed thereon than any other scientist in this country. In fact, a great deal of credit for the present status of our knowledge of the subject of calcification of the tooth tissues belongs to Dr. Andrews.

Believing that there is but little to be gained by dwelling upon those features of a subject upon which there is an agreement of ideas, I propose to take the liberty of speaking only upon those features of the paper which are not in accordance with my belief.

Like Dr. Andrews, my investigations have of necessity been confined to dead tissue, but in all cases an effort has been made to secure the specimens as soon after death as possible, so that, with prompt and thorough preparation, the post-mortem conditions must come very close to those existing in life.

First, as to the calcification of *enamel.* From the work I have done in regard to this item, I am inclined to differ with Dr. Andrews, and to accept to a great extent the theory of Tomes and others, which is generally referred to as the "conversion theory." After my studies of the enamel organ I cannot favor the belief that there is anything of a glandular nature about any one of the four layers of epithelial cells which go to make up its bulk. Neither have I been able to find a "layer of cells of the stratum intermedium interposed" between the free ends of the ameloblasts and the surface of the dentin papilla. But I have seen very many tissues showing the presence of bloodvessels in the enamel organ, with many capillaries passing distinctly through the stellate reticulum into the stratum intermedium, and I regard the presence of these bloodvessels as essential to the process of enamel calcification. In my opinion enamel calcifies through a process of transformation and conversion taking place in certain cells of the enamel organ. In other and more concise words, from the blood brought to the stratum intermedium through the numerous capillaries which are undoubtedly present, the material necessary to the construction of enamel is selected, and these cells in turn supply the calcific material to the ameloblasts, the walls of which first become calcified, followed by the solidification of the cell body or contents, the former appearing in the completed tissue as the interprismatic or cementing substance, while the latter becomes the enamel rods proper. As the primary layer of ameloblasts becomes thus converted, a new layer makes its appearance by a transformation of the cells of the stratum intermedium, this process of conversion and transformation continuing until the entire bulk of enamel is calcified.

I know that exception has been taken to this idea of cell calcification, such exception usually being accompanied by the remark that in no other part of the body does a process of complete cell calcification take place. My reply to this argument would be that in no other part of the body do we observe a structure like enamel—so largely inorganic. In fact, this tissue is so entirely different both in structure and function from any other, that its mode of generation must of necessity be different.

As far as calcification of *dentin* is concerned, I have little to add to what the essayist has stated. I have always taught and believed the theory to be correct that odontoblasts exhibit a special affinity for the necessary calcium salts which have been brought through the blood stream into close proximity to them, and held in solution in the plasma about them. Just what ground there is for any authority to make the contention that no so-called borderland tissue exists in the formation of dentin is difficult to understand. This zone is plainly seen in practically all sections, and it is just as essential to dentin formation as it is for bones to be preformed in cartilage. I have never believed that the processes from the young odontoblasts penetrate the enamel organ, remaining there in the calcified tissue, although it must be admitted that the microscope frequently shows what appears to be such an arrangement. My reasons for doubting such a distribution of the fibers lies in the fact that a distinct cap of dentin is completed before enamel calcification begins.

Cementum. Dr. Andrews says: "In the fully formed cementum the processes of the bone corpuscles—cement corpuscles or cementoblasts—undoubtedly anastomose with those of the dental periosteum, with each other, and with the processes of the granular layer just within the dentin." I am very sorry to say that I cannot agree with this theory. I believe that to a great extent the cementoblasts, after they have become encapsuled within the calcified cementum, and are called cement corpuscles, become inactive, and that while we may occasionally find the canaliculi from one cell body anastomosing with the canaliculi of another, this is only so as a matter of association. I am fully convinced that the chief difference between cementum and bone lies in the fact that there is no complete Haversian system in the former. I do not believe it would be possible to have an anastomosing relationship between the cementum and the dentin, because the peripheral surface of the dentin is completed long before there is any necessity for a cementum, which does not arise until after the tooth is erupted and the formation of an alveolar attachment begun.

Enamel cuticle. While I have not made a special study of it, there are one or two important reasons why the enamel cuticle must be recognized as the transformed external epithelial layer of the enamel organ. First, the relationship of these cells to the surface of the enamel at the time when enamel calcification is about completed, being in direct contact with this surface. Second, a condition found in all other parts of the body, *i.e.* all parts coming into direct or indirect contact with the atmosphere being epithelial in character.

I cannot close without congratulating the essayist upon the clear and concise manner in which he has presented his subject, and upon the forcible arguments put forth to support his views.

Dr. H. W. GILLETT, New York. Not being conversant with the subject of the paper, which Dr. Jarvie was to discuss in my place, I embrace the opportunity to tender my congratulations to Dr. Andrews upon having received the Fellowship medal of this society, and to offer my felicitations to the society upon having selected for that honor so worthy a recipient, whose work we appreciate, whose ability we respect, and whose sterling, lovable character we admire.

I recall having heard Dr. Andrews give a very interesting description of the way in which he overcame some of the difficulties he met with in carrying on his work. He related how, when he had reached a certain stage in his work, he found difficulties because of the vibration resulting from the transaction of the everyday affairs about his residence; how he dug a subcellar, and how even then he found that the only time he could do that work was after midnight, when the street cars were running less frequently.

When I think of the difficulties under which he labored in his special field, the following quotation is recalled to my mind:

The heights by great men reached and kept
Were not attained by sudden flight,
But they, while their companions slept,
Were toiling upward in the night.

We all have moments when we would like to do such work and achieve such results as has Dr. Andrews, who has given us the key to his life-work when he spoke of the almost insurmountable difficulties, and, in tones that thrilled, added: "I mastered them."

Dr. L. M. WAUGH, Buffalo. We are told that science is of practical value only in so far as it can be applied, and I feel that after Dr. Andrews' admirable address this audience will appreciate a few remarks on the practical application of the theory propounded.

Dr. Andrews states that calcification of the enamel of deciduous teeth begins in the seventeenth week of uterine life and continues until the sixth month after birth. If any perversion in the enamel formation of the deciduous teeth occurs, it must be due to some perversion of the nutritional process during the formative stage. Calcification of the permanent teeth begins at birth and continues until the twelfth year. If there are imperfections in the enamel due to disorders of the nutritional process, they must be brought about during this period. Illness at the age of fourteen would not affect the teeth erupted at that age, because the enamel caps were completed before the disturbance occurred. I was interested to learn of the advisability of administering certain materials for the purpose of supplying calcium salts and aiding the calcification of the teeth. Dr. Andrews tells us that in eggs and milk we have the proper elements to supply the inorganic materials for the teeth. These simple articles of diet, therefore, may and should be prescribed for young children in case of disturbed nutrition.

Dr. Andrews in the main has given expression to his belief of twenty-five years ago, namely, that the enamel is practically an inorganic structure, which is especially gratifying to me and others, after Dr. Bödecker's effort to continue the work of his father. Bödecker published a work three or four years ago for the purpose of showing that the belief of enamel being an entirely inorganic material was erroneous. The work in which he attempted to prove the presence of a great deal of organic material in the enamel was beautifully illustrated with pictures made by the ultra-violet rays at a magnification of twenty-five hundred diameters. Dr. Andrews' discourse, however, dispels all doubts as to the inorganic character of enamel, as he states that the only organic material in the enamel is that which extends into it from the dentinal fibrillæ. Dr. Broomell does not agree with this view.

The essayist has shown how the enamel rods are built up globule by globule, the primary rods extending over the surface to the periphery being made up of globules, one little sphere-like mass of material being placed on another, and that between these globules, forming a single enamel rod and passing across it, an inorganic cement material is present. This has an important bearing upon our work in regard to the development of caries. In our prophylactic treatment we polish defective enamel surfaces, thinking these defects to be the result of the carious process. Upon the enamel surface the end of the enamel rod may be exposed, and yet the surface may resist the carious process. In such cases the prophylactic method is valuable, since such enamel surfaces may be expected to resist the progress of caries. We have there really a homogeneous surface of rods, whereas if any material were present between the rods, as in the cementum and dentin, the enamel could not be polished in the way indicated.

Sometimes white spots are formed on enamel surfaces, which of course are due to decalcification, and which, under prophylactic treatment, disappear after some time. A great many students have asked me whether recalcification of these areas can possibly take place. This seems impossible, since the enamel is fully formed when the tooth is erupted and the channels for carrying the calcium salts perform no further function; still these spots disappear, and I have wondered whether these areas might not be filled in with some material in the food that brings about a translucency of the enamel. By the prophylactic method we try to polish out these spots, which in my opinion is good practice, but some of them disappear spontaneously, and I would like to have Dr. Andrews give an explanation of this phenomenon.

If the enamel is worn, we note some calcific changes in the dentinal tubules taking place to increase the insulation of the pulp. The question has been asked as to hypercalcification, and it has been argued that calcification takes place from the periphery inward, and, as the dentin is formed, the tubuli become smaller. If there is recalcification, the odontoblasts being present in the dentin, how would you explain the entrance of the calcium salts into the tubuli? If it is decalcification, how can we avoid factors which would tear down the calcium salts? We all have seen the masticating surfaces of teeth worn down to where the dental pulp originally was, hence there must be some process of calcification filling-in the tubuli.

A VOICE. You are right there.

Dr. WAUGH. I would like to have an explanation as to how that occurs. I have thought that the protoplasmic substance carrying the calcium salts there may be responsible, but so many investigators, among them Dr. Kirk and Dr. Broomell, do not favor this theory, and I have vainly tried for twelve years to find a positive explanation.

The wonderful work of Dr. Andrews and other investigators has probably sometimes discouraged younger men who started in this line of work, because they felt that these investigators must surely have had some special talent or unusual preparation for this work. Dr. Andrews' account of how he started without any special preparation, and worked up gradually and overcame the obstacles, is a great encouragement for the younger men to engage in such work, and this stimulus toward research is alone enough to warrant the award of the medal to the essayist.

Dr. ANDREWS (closing the discussion). There may be a calcifying process going on within the pulp cavity, caused by an irritating process from the outside. This takes place if an injury exists in the enamel, exposing the dentin, or in the cementum. Calcium salts are sent through the odontoblasts to the tubuli in the form of minute globular bodies, and these are seen in the tubules of the dentin matrix substance.

These globules also appear in the teeth of elderly people when the teeth are worn down, and are of a dirty brown color on the cutting surfaces. Professor Black thinks these globular bodies to be fat cells, but they are really an effort on the part of nature to protect the exposed fibrils in the dentin. This process seldom reaches full calcification.

A VOICE. Is it borderland tissue?

Dr. ANDREWS. It is a process going on to form borderland tissue, transition tissue. On the tips of old worn teeth the protecting process has taken place, and the exposed dentin is brown and glass-like. In this condition it resists infection in a marked degree. In the teeth of very vigorous old people it seems fully calcified.

If a portion of the enamel be lost, exposing the dentin, a process of repair takes place in the pulp cavity against the portion of the dentin tubules involved in the injury, and in this condition we find the minute globular bodies in the tubules. This is probably an early form of calcoglobulin.

The next order of business was the installation of the newly-elected president.

Dr. Cooke appointed Dr. Squire and Dr. Gillett as a committee to escort the newly-elected president to the chair.

Dr. COOKE. I wish to congratulate you upon your promotion to the office of president of the State Society. If during the year you derive as much satisfaction from the work of the society as I have, I am sure you will feel fully repaid for any effort incurred on your part. While the labor of preparing the program and conducting the meetings may at times be arduous, it affords great satisfaction to see the attendance at the meetings, and to feel that one has done something for the good of our society. I feel also that this society is to be congratulated upon your selection as president. Your peculiar fitness for the position is recognized by those who know you, and your experience as secretary and in the work of the society has been so extensive that I am sure we shall have a very successful meeting under your administration. You will surely have the co-operation of the members of the society, which has been so generously accorded to me the past year, and the next year will see us assembled here at a meeting that will far surpass all that have preceded. Gentlemen, I introduce to you your new president, Dr. Hillyer.

Dr. **Hillyer**. In accepting this high office, allow me to voice my gratification at the various expressions of congratulation which you, Mr. President, and others have so kindly offered.

Whatever I have done for the society in an official capacity has been done with naught but the society's welfare at heart.

That I appreciate the honor is needless to say, and I may add that the great responsibility is such that I shall expect the fullest co-operation of every member in order to carry to a successful issue the various activities which will form our year's work.

There being no further business before the society, the President declared the meeting adjourned until the second Thursday in May 1912.

THE DENTAL COSMOS

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Devoted to the Interests of the Profession.

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PHILADELPHIA, JANUARY 1912.

EDITORIAL DEPARTMENT.

THE "VINDICATION."

WE are glad to note that *Current Literature* in its December issue makes partial amends for its prejudiced criticism of so-called American dentistry which appeared in the August number of that magazine. We say *partial* amends for the reason that its article entitled "A Vindication of American Dentistry," if it really is a vindication, consists largely of quotations from editorials which appeared in dental magazines subsequent to the publication of the unwarranted attack of *Current Literature* on the dental profession and its methods; therefore the vindication is mainly through the accredited representatives of the dental profession, and the only part which may properly be credited to *Current Literature* is the fact of its willingness to correct the wrong it has done by indorsing the argument for the defense and designating that argument as a vindication. If this whole procedure did not savor so strongly of the policy of many of the purveyors of sensationalism in our daily and periodical literature, our faith in the genuineness of the vindication and our gratitude for its publication might have assumed more respectable proportions.

It is of course right and proper that the weaknesses and defects of our professional work should be the objects of criticism, for a just and proper criticism is the most effective stimulus toward the correction or elimination of all those evils which afflict us as a profession and which severally and collectively retard our progress. There is, however, a type of criticism which is unjust and destructive in its spirit as well as its tendency, in that it does not discriminate between what is right and what is wrong, and which seeks to destroy the whole fabric because it discovers imperfections in its parts. Representatives of these apostles of critical iconoclasm are found in all departments of our social organization, and no sphere of human activity wholly escapes their destructive assaults. The church, politics, the social position of women, the questions of education, of temperance, and of morals—all come in for their share of that criticism which would destroy the whole scheme because in particular instances defects in the workings or the results of these activities have been discovered.

In line with this general human tendency has arisen much of the criticism of dental methods and dental activities in general, and the tendency very quickly becomes a habit of mind. The phrase still current in France, *Il mente comme un arracheur de dents* —"He lies like a dentist"—is said to have had its origin in an incident which occurred a century and a half ago, in the practice of Garengeot, who it seems had stitched into place and secured successful union of the end of a man's nose after it had been completely severed in the course of a street fight. The account of the incident having reached the ears of the medical authorities of the time, they met and in solemn session declared that to obtain reunion of a completely severed portion of the body was an impossibility, and that the story was therefore untrue. As a result of this decision the original form of the phrase was to "lie like Garengeot," but later, the name of the supposed son of Ananias being forgotten, though the recollection of the incident and the profession of its author still prevailed, the phrase survived in its present form. It cannot be doubted that the reflex effect of this incident has been to in no small degree cast suspicion upon the standards of veracity of the profession as a whole, especially in the minds of that class of destructive critics here under consideration. As a matter of fact the reflexion is no more deserved than is the implication contained in the habit of salutation which many individuals indulge when they pat a dog on the back and say, "Poor fellow!" albeit the particular canine in question may have been reared in the lap of luxury.

In harmony with this mental habitude is the tendency to regard the field of dental activities from the humorous point of view, and we state the case in that way advisedly, for it is surely a point of view and not a question of the inherent humor of the field itself or of anything humorous that it contains. History and all experience are here unanimous—that whatever of humor may be found in connection with dentistry is that which exists in the mind of the observer; and that being conceded, we think the time has fully arrived for a more serious and respectful attitude toward dentistry upon the part of both critic and casual observer. The editor of *Current Literature* has evidently awakened to the realization that the problem of oral sepsis is one which has assumed large proportions, since his mind has been directed to a serious study of the subject. As a matter of fact, that particular phase of dental work is at the very foundation of all modern professional teaching in dentistry, and should be likewise at the foundation of medical teaching. It is a question that is enlisting the interest and sympathetic co-operation of educators, scientists, sanitarians, and all who are concerned with health betterment and disease prevention. There is therefore ample justification for treating the subject with the serious and sympathetic consideration that it inherently deserves, and for eliminating from the lay and periodical press the antiquated tendency to regard dentistry and its purposes from a humorous standpoint or to make its humanitarian work the object of ridicule or destructive criticism.

BIBLIOGRAPHICAL.

The American Text-book of Operative Dentistry. In Contributions by Eminent Authorities. Edited by Edward C. Kirk, D.D.S., Sc.D., Prof. Dental Pathology, Therapeutics, and Materia Medica, and Dean, Dental Dep't, Univ. Pa.; Editor Dental Cosmos; Officier de l'Académie de France. Fourth Edition, revised and enlarged. Illustrated with 1015 engravings. Philadelphia and New York: Lea & Febiger, 1911.

It requires courage to write a book on Operative Dentistry at this juncture in its development. Operative dentistry is in a transitory state. The old has not become obsolete, nor has the new as yet rooted itself firmly in the practice of all dental operators. This fact has been well recognized by the editor of the "American Text-book."

It has always been a question whether the best book on operative dentistry can be produced by the co-operative effort of different and to a degree heterogeneous essayists, or by a single author. Operative dentistry now comprises so much more than it did but a short time ago, that it seems not only justifiable, but necessary, for a number of men to contribute to the production of a book of this kind. The fact that the "American Text-book of Operative Dentistry" appears in its fourth edition is in itself the greatest justification that such a work can receive.

In the chapter on Dental Histology with Reference to Operative Dentistry, Dr. Frederick B. Noyes acknowledges his indebtedness to Dr. G. V. Black for much advice and many suggestions. It is questionable whether there is any chapter in any book on operative dentistry whose writer is not placed in a similar position. Dr. Thompson's chapter on Dental Odontography (chapter I) would not bear the stamp which it does had not G. V. Black written his classic work on the anatomy of the teeth.

Aside from its scientific thoroughness, the most pleasing and valuable part of Dr. Noyes' chapter to the student will remain his endeavor to constantly apply his scientific findings to practical use. Dryness and dogmatism, which are so often associated with articles on similar subjects, have made room for vivid description and lucid application to practice.

Dr. James Truman in the third chapter of the book, on Antisepsis in Dentistry, has put the same forcefulness into the presentation of this subject that the dental profession has enjoyed from him for many years. It is devoutly to be wished that all of the young and many of the older members of the profession will commit part of this chapter to memory and not forget its application.

Dr. Guilford in chapter IV, on the Examination of Teeth, does not consider the electric mouth mirror to be a necessary adjunct. This is correct as far as the experienced eye is concerned. The less experienced operator, however, will find it a great help in detecting the insidious approximal cavities near the contact points in posterior teeth.

In chapter V, Dr. Guilford discusses

the different methods of separating teeth. No doubt every operator of experience agrees with him that the Perry separator has been and remains to this day the best instrument of its kind. It is difficult to see, however, why Dr. Guilford failed to mention the different Ivory separators, which supplement the Perry separator most excellently.

In chapter VI, Dr. Guilford treats of Hypersensitive Dentin. Of cataphoresis he says, "It met with great favor because of the perfect results obtained, but later it was found to be a very slow method," etc. The only real objection is its slow action. For every other deficient result, the reviewer feels quite sure that the operator and his lack of time have been at fault. Cataphoresis is a time process. A feature absent from this chapter is the psychic control of the patient, a factor that is of as much importance as any of the other or more direct remedies.

Dr. Thomas E. Weeks treats, in chapter VII, of the technique of Cavity Preparation. It is a most valuable addition to the new work. It gave Dr. Weeks an opportunity to rewrite much that he previously stated in his own book, and demonstrates again that he is above all a thoroughly scientific mechanic.

In chapter VIII, Dr. Louis Jack describes a number of clamps except Ivory's. In the reviewer's opinion Ivory furnishes a better rubber-dam clamp today than the profession has ever had.

Chapter IV, by Dr. Edwin T. Darby, treats of Filling Cavities with Metallic Foils. It is quite useless to add to or detract from or criticize anything Dr. Darby says on this subject. On reading the sentence again that "Many claim that non-cohesive foil has no place in dental practice," a smile passed over the reviewer's face. At that very time he had two large and perfectly sound non-cohesive fillings, including nearly the entire occlusal surfaces of the lower first molars, partly removed. They were filled thirty-two and thirty-four years ago respectively, one by Dr. Frank Schuyler, his preceptor, and the other by Dr. Frank Abbott of New York. The gold was packed without the dam, one in sixteen minutes, the other in twenty. It is well to see through more than one hole even in dentistry, and the amount of space Dr. Darby has allotted to this method is more than justified by the results obtained through it.

Chapter X, by Dr. W. Crenshaw, on the Use of the Matrix in Filling Operations is one of the chapters which is of great value to operators. How many of the coming dentists will employ this method in these days of gold inlays? In a short time this chapter will read to the student like a myth of bygone days, and yet we cannot well miss it in such an important work on Operative Dentistry.

In chapter XI, Dr. Marcus L. Ward treats of the Plastics in a quite exhaustive manner.

Chapter XIII contains the different Inlay Methods, and is written by Dr. W. A. Capon. The older practitioners will miss Dr. Jos. Head's authoritative writing, though Dr. Capon has done full justice to the subject. This method of filling teeth is of such vast importance that any amount of elaboration thereon must be welcome to both student and practitioner. It was a happy and proper thought in connection with gold inlays to have quoted Dr. Wm. H. Taggart as fully as has been done.

The Treatment and Filling of Root-canals receives a most painstaking consideration by Dr. Otto E. Inglis. It is the reviewer's opinion that the Myers compound syringe is used at the present time on state occasions only. Paralyzation of the transmitting apparatus in extirpating the pulp by injecting the diploe with cocain has certainly been found effective, but the probability of after-pain, covering at times a period of several days to three weeks, should make one hesitate to employ this method instead of the slower and simpler ones. This refers particularly to the area near the third molar. On page 408 we find a reference to the knocking-out of pulps with a Portuguese toothpick, a method that had its vogue in the early days of crowning. It was heroic in the extreme, and was at the cost of more than one patient and the confidence of many more. As a dark-age method there is no question of its efficiency. The part of Dr. Inglis' chapter which relates to dento-alveolar abscess deserves special mention for its excellence.

Chapter XV, by Dr. Edward C. Kirk, treats of Pyorrhea Alveolaris. There is no subject before the dental profession today which is of greater importance, and Dr. Kirk has made the most of his opportunities in the fifty-five pages allotted to the subject. Among the irritative factors that contribute to the development of pyorrhea through the maltreatment of the pericementum he mentions above all the *physical insult* to it which results from an unskilfully fitted artificial crown. It would probably take the reviewer a lifetime to coin such a happy phrase as "physical insult." With a master of the English language such coinage becomes a habit. Be that as it may, "physical insult" will stick and apply. The discussion of vaccine therapy in oral infections (page 509) is most interesting. From the office routine standpoint, however, it is less satisfactory because of its very limited applicability. Salivary tartar formation, based on the known experiments of Rainey, is new in any dental text-book and original with Dr. Kirk. The theory of Rainey has not been contradicted so far. John and Chas. S. Tomes in their "System of Dental Surgery," 1873, mention Rainey's researches with the valuable addition by Professor Harting. They give it special emphasis in their work, in connection with the formation of dentin. The dental profession's attention was again called to them by Chas. S. Tomes in his work on "Comparative Anatomy," 1894. It was left to Dr. Kirk, however, to apply these researches to the formation of tartar, and supplement them with his own original thought. If the findings of the previous thinkers have remained undisputed, there is every reason to assume that Dr. Kirk's researches will likewise remain so.

Discolored Teeth and Their Treatment, by Dr. E. C. Kirk (chapter XVI) is given a liberal amount of space, and the subject is considered in all its phases. None of Dr. Kirk's many contributions to dentistry are more welcome than those based on the science of chemistry. He is a master of the subject. The teachings as to bleaching methods for special stains are concise, interesting, and highly instructive, and should take well with those whose bent is chemistryward.

Extraction is very fully discussed and splendidly illustrated by Dr. M. H. Cryer in chapter XVII, especially the difficult cases that now and then are attended by unfortunate results. The chapter shows the man who is thoroughly at home in surgical anatomy.

Local anesthesia receives a broad and full treatment in chapter XVIII, by Dr. Hermann Prinz. Dr. Prinz is one of the new-comers in connection with the "American Text-book of Operative Dentistry," and a most welcome one for both old and young practitioners. Dr. Prinz' chapter is replete with matter culled from his personal observation and experience. His elimination of the army of substitutes for cocain, novocain only excepted, is of great value to both student and practitioner.

Chapter XIX, by Dr. Louis Ottofy, treats of the Plantation of Teeth. Speaking of replantation in cases of pyorrhea alveolaris, Dr. Ottofy tells us that only in rare cases is an attempt to cure by this method justifiable. In the reviewer's opinion the cases are not so rare. The pericementum being the seat of suffering in most instances of pyorrhea alveolaris, its timely destruction is frequently the only cure. This cannot be better obtained than by replantation. The mode of attachment still remains a mooted question. While none may know the nature of the structure that binds the tooth to place, of the fact no one entertains a doubt. The difference of sound on percussing the implanted tooth and the one in its natural physiological environment seems to exclude Dr. Younger's theory of revivification of the entire pericementum. On percussion the sound of the planted tooth has a ring as if two hard substances were in contact. In the case of the existing pericementum the sound is muffled.

Chapter XX deals with the Treatment of Children's Teeth. It is the reviewer's opinion that this part of operative dentistry may also become a specialty of its own. The younger men, and particularly the lady practitioner, will take care of this branch. The treatment of children's teeth is both psychological and operative; the man with a large practice is not always the ideal master of that subject.

The book closes with chapter XXI, on Orthodontia, by that well-known authority, Dr. E. H. Angle. The reviewer sees no special use for an appendix on orthodontia in any work on operative dentistry. Every dental student should be well grounded in the general principles of orthodontia, but two hundred and thirty pages written on this subject—and no less space could do ample justice to it—is more appropriately placed in a work of its own.

The work as a whole is a splendid specimen of American dental thought, and as such must be welcome to all. Its fault is its occasional repetition, unavoidable in a book written by different authors. This slight deficiency is largely overbalanced by the broadness infused by the numerous writers. The typography of the book, its illustrations, paper, and binding are the best possible. If a suggestion is in order at this time, I would advise colored photographs for some of the illustrations in the next edition. It is a work of which the editor, the contributors, and American dentists may well be proud.

R. H. HOFHEINZ.

HISTOIRE GÉNÉRALE DE LA CHIRURGIE DENTAIRE, DEPUIS LES TEMPS PRIMITIFS JUSQU'À L'EPOQUE MODERNE ET PRINCIPALEMENT EN FRANCE. [General History of Dental Surgery from Primitive Times to the Modern Epoch, and Especially in France.] By J.-L. ANDRÉ-BONNET. Pp. 318. Paris: Société des Auteurs Modernes, 1910.

If the reader should expect to find in this book the product of the pen of a scientifically trained historian, such as we have in Guerini's work, he would be doing an injustice to the author, who in his facile language states as the purpose of his book "to exalt, to sing a panegyric to that art which preserves, which restores, which builds." He has undertaken to write a work "not exclusively for the dentist, not a purely technical work, but one which is readable for the general public, at the same time attempting to dispel all false notions prevailing by exposing to broad daylight a history which has no reason whatever to remain in the shade." This he does in the fascinating style of the essay in that language which has produced such charming yet sufficiently substantial *causeurs* as Flaubert, Daudet, and Guy de Maupassant. The author desires to instil his *confrères* with that pride and self-respect which the dentist's scientific, literary, and medical capacities warrant, and to equip him with that intelligent knowledge of the traditions of his profession which will command the respect and confidence of his patients.

The essays on the finds of prehistoric human jaws, on dentistry among the ancients and in the early Christian era, among the Arabs and in the middle ages, furnish most entertaining reading, but the gems of the collection are those chapters in which the author stands on home ground, and relates the histories and stories of those venerable ancestors of dentistry, Ambroise Paré, Urbain Hémard, Fauchard, Garengeot, or Talma, tells the time-honored anecdote of the "golden tooth," or recounts the memoirs of a barber-surgeon of 1598 who defends his venerable calling against the scorn of malicious detractors, and revolts against the unfair competition within its own ranks.

The chapters on the origin of porcelain teeth and on porcelain in antiquity are of special technical interest. The author's bibliography is a valuable supplement to Crowley, especially in regard to French sources. Strange to note, Guerini's book is not mentioned.

Altogether, this book will afford any dentist, or patient, who enjoys spending an idle hour over a French volume, some highly interesting and instructive reading.

CHEMISCH-TECHNISCHE REZEPTE UND NOTIZEN FUER DIE ZAHNPRAXIS. [Chemical and Technical Formulæ and Hints for Dental Practice.] A Collection of 1300 Practical Prescriptions, Methods, and Hints. By ALFRED SEDLACEK. Third Edition, completely revised and enlarged. Vol. 299 of "Chemisch-Technische Bibliothek." Vienna and Leipzig: A. Hartleben, 1910. Pp. 456. *M*.6.00.

The author has culled a liberal number of practical and up-to-date formulæ and hints for the everyday practice of the busy dentist, from the most reliable sources, among which the American dental journals are worthily represented. A very liberal index enables one readily to find practical advice in cases of emergency that may arise in any department of dental practice. Each one of the five parts offers ready reference—Part I, on oral hygiene and cosmetics, with the following subdivisions: dentifrices, tinctures and washes, tooth-powders, tooth-pastes, cachous, antiseptic tablets, perfumes for the office, soaps for the office and laboratory, aids in the care of the hands; all the other parts—*i.e.* on chemical, therapeutic, anesthetic, and technical items, on filling materials and plastics, on accessories in melting, molding, and casting, on metals, and on varnishes, cements, and mastics, cleansing and polishing agents, etc., with their numerous subdivisions—offering a similar wealth of handy information.

In the dental office or laboratory this little volume should prove a valuable elbow-book.

REVIEW OF CURRENT DENTAL LITERATURE.

[*Deutsche Zahnaerztliche Zeitung*, Berlin, June 18, 1911.]

CASES OF THE PRESENCE OF TEETH AT BIRTH. By Dr. A. Herpin, Paris.

The presence of teeth at birth has ever impressed the imagination. A remarkable future was prophesied to the lucky infant, and numerous celebrities claimed to have possessed at birth one or more fully developed teeth. Mere early eruption of the teeth is of little interest, since the terms of eruption of the deciduous teeth vary widely. There is, however, another category of early eruption which must be regarded as a real anomaly of development, characterized by the presence at birth or appearance soon after of papillæ, which soon disappear after the gingival tissue has been broken through. They consist in an imperfect germ, from which the crown of a tooth becomes fully developed. This germ possesses a superficial tooth portion, movable upon the underlying connective tissue. In nursing, children in whom this anomaly is found can incline this denticle upon the mucosa and make its posterior surface touch the nipple of the breast. This mobility is gradually increased, and after a varying period of time the denticle is cast off, exposing the embryonal bulb, which in turn rapidly disappears.

The author reports two cases of this anomaly. In one case the child—which was born at full term, the mother having no pathological history except frequent vomiting during gestation, and having borne several other normal children—exhibited at birth at the region of the lower centrals two papillæ of about 2 mm. in height, flattened antero-posteriorly and covered with mucous membrane. Four and five days later, respectively, dental crowns appeared. Both papillæ were movable upon the alveolar ridge. On the eighth day the crowns were fully erupted, on the ninth the left one was almost severed, falling out on the tenth day, exposing the dental bulb, which in turn disappeared the next day. The other crown and bulb also disappeared on the nineteenth day.

In the second case a girl, born at not quite full term of a normal mother without pathological history, exhibited slightly to the right of the symphysis of the mandible a small broad elevation of 2 mm. in height, flattened antero-posteriorly, of fibrous consistence and covered with mucous membrane. A week later the mucous membrane was perforated and a portion of a movable tooth appeared. The first child of the same mother, born after seven months' gestation, had exhibited the same anomaly, the movable crown persisting to the child's death, which ensued seven weeks later. Similar hereditary cases have previously been observed. Inflammatory affection of the oral mucosa was not noted in either of the cases reported.

In regard to etiology, the author suggests that these cases represent anomalies or eruption caused by dystrophic influences which still need to be explained. He points out similarity with prelacteal dentition as observed in certain mammals.

[*British Journal of Dental Science*, London, July 15, 1911.]

THE BLOOD PRESSURE IN ANESTHESIA. By Drs. Wm. Guy, Alexander Goodall, and H. S. Reid, Edinburgh.

It may be said that the effects of an anesthetic on the circulation are of little importance unless the blood pressure is altered, and that any disturbance of the blood pressure caused by an anesthetic is an effect of much moment, well worthy of careful study. An anesthetic which affects the blood pressure but slightly is, other factors being equal, to be preferred to one which affects it more. The authors have joined their efforts in the present research, with the following objects in view: (1) To observe and compare the effect of the administration of various anesthetic agents on systolic pressure; (2) to note any variations in the effect produced by different methods of administration, and (3) to ascertain the conditions favorable to the production of the minimal disturbance of systolic pressure during the induction of anesthesia. The following agents were employed: Chloroform; ether; nitrous oxid by re-breathing, with valves, or preceded by oxygen; nitrous oxid and ether in sequence; ethyl chlorid; gas and ethyl chlorid in sequence; oxygen, gas, and ethyl chlorid in sequence. The operations, save those done with chloroform and ether, were dental, and the patients were seated. The carefully tabulated results of each method employed led to the following conclusions: That there is no practical difference between the available anesthesia brought about by nitrous oxid when re-breathing is allowed and that available when nitrous oxid is given with valves, but that the effects of asphyxia are much more marked in the latter method. The asphyxial element present in the re-breathing method can be avoided by the previous inhalation of a gallon of oxygen, but the period of available anesthesia is often shortened a few seconds. Ethyl chlorid causes marked disturbances of the circulation, and in large doses may bring about a dangerous fall of systolic blood pressure by inhibition of the heart. This fall is prevented by the previous inhalation of gas, the effect then being a constant rise, probably, in part at least, due to asphyxia. The slight asphyxial element in gas and ethyl chlorid anesthesia can be eliminated by the previous administration of a gallon of oxygen without any shortening of the period of available anesthesia.

[*Le Laboratoire et le Progrès Dentaire,* Paris, June 4, 1911.]

CANINES AND INCISORS WITH TWO ROOTS. By Dr. E. Dunogier.

Canines with two roots, according to R. Gourdon of Bordeaux, who in one year found three such teeth, are really not as rare as is generally presumed. A few other cases of this anomaly have been previously reported, and probably more could be added if every operator took the pains to report his cases. Incisors with two roots, however, are of much rarer occurrence. The author knows of only three such cases, one of which was reported by Ebernod of Geneva, the other by J. Larrêa, while the third case dates back from twenty to forty thousand years, and was discovered in a jaw of the neolithic period found quite recently by H. Muller in the Fontabert cave near Buisse, Isère. In the same jaw three canines with double roots are present, which tends to prove that this phenomenon was much more frequent in our ancestors. In another skull of the same period a canine with two cusps was found.

Dr. Dunogier of Paris gives the following explanation for these phenomena: The human teeth are formed by the fusion of conical or biconical teeth, of which the supernumerary appears as prototype. All the teeth of this group, *i.e.* incisors, canines, and bicuspids, are formed by a union of two similar teeth, of which the anterior is a little larger than the posterior one. The canine is subject to the same law, as is evinced by the bilateral longitudinal groove and the occasionally observed bifurcation of its root. From these premises it appears that the human jaws originally had two concentric ridges of teeth, numbering about eighty-eight, which were united by twos or fours in accordance with their functions, instead of remaining separate as in the shark. Transitional stages have been observed in man, and cases of probable reversion are frequently enough observed in the form of supernumerary teeth, etc. Bifurcation or double roots in canines, incisors. and bicuspids is therefore to be explained as incompleteness or lack of fusion of the roots. In the same way the four roots in some molars, the more or less deep fissures in the enamel and dentin of the masticating and approximal surfaces of bicuspids and molars, and the fissures in the lingual surfaces near the necks of upper incisors are to be explained as imperfect fusion of the parts destined to form the crowns.

[*American Medicine,* Burlington, Vt., October 1911.]

CHEWING-GUM AS A MOUTH CLEANSER. By Dr. LeGrand Kerr.

Kerr finds that the use of chewing-gum is very advisable in keeping the buccal cavity clean, particularly in diseases of children. The child naturally rebels against the cleansing process while it is very ill, and therefore, if some more attractive and efficient way can be found to accomplish the same result, we ought to take advantage of it. The use of chewing-gum seems to offer the most relief. It is attractive to the child, and through its use at stated intervals the little patient is led to produce effectively two results that are most important in keeping the mouth and tongue clean—stimulation of the flow of saliva and the beneficial movement of the tongue, which is a most efficient cleanser through its mechanical action alone. This method has been tried for months by the writer in cases of typhoid fever, scarlet fever, measles, and diphtheria, always with beneficial results. A fresh piece of gum must be used every time, and the old piece destroyed. The use of gum need not, however, result in the absolute discontinuance of the other methods of cleansing which are commonly in vogue. Its use certainly should not create a false sense of security; although it is highly effective in its results, there should be instituted the same care and thoroughness of examination of the buccal cavity in all of the infectious diseases of childhood, and this examination should always be an important part of the routine examination. The chewing of gum is only one of the many measures that may be taken to keep the buccal cavity reasonably clean, but the writer has found it to be a most important and pleasant one for the child.

[*Les Annales Dentaires*, Paris, July to September 1911.]

CAST METAL APPLIANCES. BY DR. PAUL MARTINIER.

The author offers the results of extensive experiments with the casting method of prosthetic appliances, and briefly states his conclusions as follows:

Gold plates cast under pressure are superior to swaged ones in regard to faithful reproduction of the model, adaptation in the mouth, and resistance to the stress of mastication. Prolonged observation of such plates being worn in the mouth has fully demonstrated the advantages of the casting method over any other. Cast aluminum plates may be advantageously employed owing to their great lightness, their favorable behavior toward the oral mucosa, which is not irritated by this metal, and by the ease with which they can be cleaned by boiling; finally, by the possibility of combining an aluminum base-plate with vulcanite without the risk of the metal being acted upon by the hydrogen sulfid from the rubber. Commercial aluminum may be employed if it is correctly manipulated, though 99.8 per cent. pure aluminum specially prepared for our purpose is far preferable. Pure aluminum plates keep very well in many mouths, and can be successfully combined with iridio-platinum clasps. Contrary to general opinion, platinum-pin teeth can be employed without the platinum undergoing so much alteration as to impair the solidity of the appliance.

The general adoption of cast metal appliances in the future seems assured, and their superiority over those made by the old methods is indisputable. Yet while seemingly easy, the casting method requires special training and great care to yield perfect results.

[*Journal of the American Medical Association*, Chicago, September 2, 1911.]

AN EPIDEMIC OF CHANCRES OF THE LIP FROM KISSING. BY DR. J. F. SCHAMBERG, PHILADELPHIA.

Schamberg reports such an epidemic, from which the dentist may realize the vital importance of correct diagnosis of all specific conditions and of avoiding the transfer of such disease to himself or to his other patients. A coterie of young men and women, varying in age from sixteen to twenty-two years, gave a minstrel performance as a benefit. Following this, a party and later a banquet were given at which juvenile kissing games were indulged in. One of the participants, a young man of twenty-two, had a sore on his lip, the nature of which he avers he did not know. In six young women kissed by him chancres of the lip developed. A young man present at the affair likewise was attacked with a chancre of the lip, apparently from the virus deposited on the lips of one of the young women, for he did not come into contact with the original source. In addition, a young woman kissed by the offender at a third social function likewise suffered from initial sclerosis, making in all eight labial chancres from the one source. The matter was called to the attention of the Department of Health of Philadelphia by a physician under whose care three of the patients came. The original offender was apprehended by a detective and brought to the Health department quarters, where Dr. Schamberg examined him, securing the following history: The patient first noticed a sore on the left side of the lower lip about February 12, 1911. On March 3d he consulted a physician, who, according to the statement of the patient, did not inform him of the contagious nature of the lesion. The physician on being interrogated declared that he advised the young man to take all precautions. At the time of the examination, about June 20th, he presented the remains of a chancre of the lower lip, pronounced tonsillar ulceration with mucous patches, and a maculo-papular eruption over the trunk. Dr. Schamberg concludes that this most deplorable epidemic should teach a lesson which cannot too strongly be impressed on the public, *i.e.* the danger of promiscuous kissing, either between those of the opposite or the same sex. This should be taught as a matter of everyday hygiene. In the second place, physicians—and we must emphatically add, also dentists—must recognize that a tremendous responsibility rests on them in safeguarding the public from luetic patients under their care. Too often the instructions given to patients suffering from syphilis are perfunctory and unimpressive, if not omitted altogether. This epidemic likewise emphasizes the intense infectivity of extragenitally located chancres—swarming, as they are, with spirochetæ.

[*Deutsche Zahnaerztliche Wochenschrift*, Berlin, June 24, 1911.]

DEFECTS IN SPEECH IN ANOMALIES OF THE TEETH AND PALATE. By Dr. E. Pasch, Breslau.

Dentistry no doubt stands in close relationship to the therapy of speech defects. Of dental anomalies, those of occlusion play an important rôle in defective speech. Missing teeth and malposed teeth prevent the correct pronunciation of S sounds, this defect being called lisping or hissing. This defect does not occur in every case, molars, bicuspids, and lower canines causing it only in exceptional cases, while the incisors are very frequently involved. This lies in the very nature of the S sounds, which in phonology are called frictional sounds, since in their formation the teeth are occluded, the tip of the tongue touches the median line of the mandible, and the air-current passes through the fissure formed by the incisors. No wonder, then, that any defect in the incisors influences the pronunciation of the S sounds, *i.e.* s, soft c, z, x, soft ch, sh, since the tongue protrudes into the vacant space, and the frictional sound cannot be produced correctly, thus causing lisping. A disagreeable hissing sound is produced if by the narrowness of the arch one or more teeth are forced out of alignment, the air then being forced through the vacant space. A similar sound is produced by teeth that have erupted in the palate, the air-current coming into friction with them. Hissing can arise from artificial causes, *i.e.* by lateral bridges which do not fully conform to the arch, the tongue having the tendency to play at such a place of deviation, and to divert the air-current laterally.

Disturbances in articulation due to anomalies of occlusion not only predispose to false pronunciation of the S sounds, but also render the pronunciation of f, v, and ph incorrect or impossible. In the formation of these sounds the upper incisors are brought down on the lower lip, and the air-current has to pass through this closure. In prognathism f, v, or ph cannot be formed in that manner. Lisping or lateral hissing in abnormal occlusion is caused by large oval spaces formed at the median line or laterally in articulating. The air-current passes undisturbed through these spaces, regardless of the correct or incorrect position of the tongue. The tongue, having the natural tendency to fill up these spaces, still further enhances this defect.

In the therapy of these speech defects the dentist should co-operate with the specialist for their correction. It has been variously suggested to put the teeth into proper alignment, to extract, regulate, etc. In prognathism Warnekros builds up the molars with gold. Whatever the therapeutic measures adopted, extraction can hardly be justified. Modern orthodontia has produced wonderful effects in this respect, but even after regulation correct speech is not reestablished spontaneously unless the defect be due simply to one or more cavities, the proper filling of which will produce the desired phonetic results. In such refractory cases the specialist must teach the patient how to properly form certain sounds and to exercise the muscles involved in the production of normal speech.

In examining the children with defective speech in the Breslau municipal schools, the author found that thirty per cent. of these defects were due to cavities, and another thirty per cent. to dental anomalies, which were cured by proper dental or orthodontic treatment and speech exercises, thus saving these children a great deal of annoyance and misery in later life.

Another category of speech defects is connected with congenital or acquired palatal anomalies. Normally, in speaking, the air-current passes through the mouth during expiration, together with the voice and the oral cavity and its various parts, forming the different sounds of our language except m, n, and ng (the last in German), in the pronunciation of which the air passes through the nose, these sounds hence being called nasal sounds. In the pronunciation of all other sounds the nasal cavity is closed by the velum palati, or soft palate. In palatal defects this closing membrane between the nasal and oral cavities is missing, hence the ugly hissing sounds produced by the passing of the air-current through the mouth and nose simultaneously. Thus, all sounds are nasal—the defect, termed *rhinolalia aperta*, being distinguished from *rhinolalia clausa*, which is due to the passing of too little air through the obstructed nasal passages. This latter defect, however, is frequently associated with congenital palatal defects.

Acquired palatal defects affect the speech only when they involve the soft palate to any great extent. A prosthetic piece immediately remedies the speech defect, especially since these patients, before acquiring their palatal defect, by tuberculosis, syphilis, cancer, etc., have enjoyed normal speech. Congenital palatal defects consist in cleft palate, the patient not only having nasal speech but being unable to form most sounds, especially those which involve the palate in their formation. The author recommends the insertion of an obturator after closure of the cleft, since in most cases the surgically formed velum palati is not sufficiently large to completely close the nasal passages in speech. After inserting the obturator, the patient must be taught by a specialist how to avoid nasal sounds, and how to form normal sounds by exercising his muscles and using the obturator correctly.

This article contains much food for thought as to the effects and the necessity of preservative and orthodontic treatment of the teeth in regard to speech, and points out a new and most promising field for exploitation in connection with the oral hygiene movement, *i.e.* the correction of defective speech in children.

[*Journal of the American Medical Association*, Chicago, October 21, 1911.]

KEEP THE TOOTH-BRUSH CLEAN.

("CURRENT COMMENT" DEPARTMENT.)

Another time-honored and long-cherished institution has been attacked by the ruthless scientist and hygienist. This time it is the tooth-brush. Soap and the tooth-brush have hitherto been considered almost indispensable adjuncts of civilization. After years and years of patient teaching of the young that correct personal hygiene required the use of the tooth-brush, after its adoption as a necessary or desirable part of the accouterment of the United States soldier, who proudly carried it, stuck in the band of his hat, in the campaigns in Cuba, Porto Rico, the Philippines, and in the Boxer rebellion in China, where it was observed and commented on favorably by the observers of the sanitary departments of the armies of the world, it is now to be discredited because it is not conformable to modern hygiene and sanitation. The tooth-brush, according to Smale and Jones ("Bacteriology of Tooth-brushes," by H. Smale and D. W. Carmalt-Jones—see "Periscope," this issue of COSMOS, page 129) becomes septic after being used once, each bristle becoming an inoculating needle by which the person using it may become inoculated with the multitudinous germs which flourish on it, producing pyorrhea alveolaris, with such serious possible sequelæ as anemia, gastritis, and arthritis. They propose as a solution of the difficulty that a new brush be used each time, or that the brush be boiled for five minutes after each using, or that it be kept in a one per cent. solution of tricresol or a ten per cent. solution of formaldehyd. It is a bit disconcerting to think that we have been going along all these years teaching the correctness of the use of the tooth-brush, only to find that instead of being an aid to good personal hygiene, it has been an instrument for creating or perpetuating infections. How long will it be before that remaining bulwark of civilization—soap—is also attacked, and the warning given that the unctuous substance that we smear over our faces and bodies daily is nothing more nor less than an emulsion of deadly bacteria, and that it is only because of our high degree of natural resistance that we have not succumbed? Seriously, however, the contention of Smale and Jones should not be ridiculed, nor, on the other hand, should this useful instrument be discarded, lest a worse state follow. But the danger of auto-inoculation with bacteria from the mouth by the brush is perhaps not to be feared so much as its contamination by extraneous matter from lack of proper care in keeping. The methods of disinfection suggested by Smale and Jones, while ideal, are not practical, because they will not be carried out. An effective method, and better because practical and simple, would be to wash the brush thoroughly after using, rinse it in an antiseptic solution—boric acid, for instance—and then keep it in a bottle corked with antiseptic cotton. The hygienic condition of the tooth-brush is certainly a matter worthy of attention.

[*La Revue de Stomatologie*, Paris, September 1911.]

ENLARGEMENT OF ROOT-CANALS WITH SODIUM DIOXID. BY DR. OTTO ZSIGMONDY, VIENNA.

For removing pulp débris and enlarging root-canals two methods are at the operator's command, *i.e.* the mechanical and the chemical. Reaming of a root-canal involves great risk of perforation, especially in irregularly shaped roots, or of breaking of the reamer. Chemical agents are especially favorably indicated in flat and broad roots where the reamer is liable to leave some small fragment of pulp tissue behind, which may become the cause of a new infection. Two kinds of chemical agents are available, namely, acids and caustic alkalis. The action of organic or inorganic acids consists in the dissolution of the calcium salts of the dentin, leaving a cartilaginous mass that is more or less easily removed by mechanical means. The action of caustic alkalis is different. The organic matrix is destroyed and the calcium salts are eliminated in the form of a white powder. The walls of the root-canal are not softened, which is very important, as the alkalis do not perceptibly attack the inorganic enamel like the acids. The same applies to steel instruments, which are rapidly attacked even by weak acids, while prolonged contact with alkalis has no detrimental effect upon them. Schreier of Vienna therefore recommended potassium and sodium, Kirk sodium dioxid, for enlarging root-canals. The author has employed sodium dioxid for this purpose during a period of twelve years with satisfactory results, the manipulation of this drug being very easy and effective, provided it has not undergone any decomposition. The action of the sodium dioxid upon the dentin is due to its almost instantaneous decomposition in contact with water, and the formation of sodium hydroxid and hydrogen dioxid. This reaction produces a considerable elevation of temperature, which in turn decomposes the hydrogen dioxid into oxygen and water, thus giving two very valuable agents, *i.e.* sodium hydrate, which fully dissolves the organic substance in the dentin around the root-canal, and nascent oxygen, which possesses great antiseptic power. The oxygen in escaping carries with it the pulverized and viscous substances split off, while the hydrogen lubricates the canal and permits of easy introduction of a broach into the depth of the canal. The sodium dioxid must be introduced into an entirely dry canal, and is then decomposed by introducing a drop of water. Exposure to the carbon dioxid in the atmosphere slowly decomposes the sodium dioxid, which loses its oxygen and forms soda, thus becoming inert. The drug must therefore be kept in an hermetically closing receptacle. In introducing the powder a Donaldson or Miller broach is dipped in glycerin, then charged with as much powder as will easily adhere and carried into all recesses of the root. The small pieces of the drug which are sometimes found in the metal receptacle should not be used, as they may drop off the broach and produce slight burns on the mucous membrane. The rubber dam is always indicated, since even the moisture of the breath may start the reaction. After the powder has been introduced into the canal and moistened with a drop of water, small oxygen bubbles are immediately observed at the orifice of the canal. The broach is then withdrawn a little to permit the water to penetrate to the fundus of the canal. The broach is then introduced a little more deeply under careful rotation; if it meets with no resistance and advances notably, the operation is successful, if not, the application is repeated, and, if necessary, a larger broach is used to enlarge the canal and to remove any pulp débris that may have been forced to the end of the root. Even the most inaccessible canals can thus be reached and cleaned to the very apex. Sometimes the canal orifices, especially in the buccal roots of upper molars and mesial roots of lower molars, are invisible; here also sodium dioxid is indicated, as the dentin loses its color and the orifices are indicated by small dark points, which are then enlarged with fine broaches. If calcareous deposits or pulp-stones are present, the sodium dioxid is especially valuable, as it dissolves all these secondary concretions, or splits them away from the pulp chamber or canal walls, thus opening the way to the apical portions. All danger is avoided by using only fine powder on a broach, without cotton. Accidents to the mucous membrane can be readily avoided by ordinary care, and if a particle should come in contact with the mucosa by careless manipulation, ordinary water will immediately relieve the burn. The irritation of the periapical region which sometimes follows disappears very rapidly. Sodium dioxid can therefore be warmly recommended not only for its disinfecting, cleansing, and bleaching action, but also for its efficacy in enlarging tortuous and inaccessible root-canals.

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PERISCOPE.

Repairing Gold Crowns.—A gold crown can be very successfully repaired if a thin piece of platinum be held in place by sticky-wax applied outside, the soft investing material being poured within.—G. A. Wilson, *Journ. Allied Societies.*

Carving Cusps for Swaged Gold Shell Crowns.—The band is made, contoured, and filled with moldine. The cusps are then carved with a wax spatula and dusted with lycopodium powder. An impression of the cusps is taken in dental lac, and 32-gage gold plate is swaged into this impression by the use of some cusp swager. The cusps are then trimmed and filled with solder.—C. H. Chamberlain, *Dental Summary.*

Building up Porcelain Crowns or Inlays.—A simple apparatus can be made from an old electric bell by means of which porcelain can be packed with great rapidity, ease, and thoroughness in a crown or inlay matrix. The knocker of the bell simply taps the porcelain in position, doing away with the necessity of the longer and drawn-out operation of jogging it down with a serrated instrument.—W. E. Cummer, *Dominion Dental Journal.*

Importance of Hard Plaster of Paris in Vulcanite Plate Work.—One of the first essentials in the production of accurate vulcanite plate work is the use of hard plaster of Paris; not only plaster which makes a hard model, but plaster which is hard during the vulcanizing process and after it, because in the cooling of the flask the rubber shrinks, and if the flask is not properly constructed and the plaster softens during vulcanizing, the case warps and the fit is altered. All fine and superfine plaster softens during vulcanization.—G. Brunton, *Dental Record.*

Carbolic Acid for Preventing Pain During the Cementing of Crowns and Bridges.—A method of preventing pain in the cementing of crowns and bridges consists in smearing the inside of the crowns with carbolic acid, and trying them on. The carbolic acid desensitizes the tissue, and the operator is enabled to see if any adjustment is needed before final cementing. To prevent gum irritation from the cement, the outside of the crown is smeared with vaselin, which prevents the cement from adhering to the gold, so that any surplus can be easily removed by a stream of tepid water from a syringe.—*Commonwealth Dental Review.*

Oxydase in Saliva.—Human mixed saliva contains an oxidizing enzyme distinct from ptyalin, which enzyme exhibits the properties of both an oxydase and a peroxydase. It is a product of the body (probably glandular) metabolism, and may be increased in quantity or activity by mastication. It is more resistant to heat than ptyalin, but more easily destroyed by acids. The color obtained with a freshly prepared 1 per cent. solution of pyrocatechin is sufficient test for this enzyme in saliva.—M. H. C. SMITH and C. F. MACDONALD, *Dental Summary.*

Bacteria of the Mouth and the Value of Tooth-brushes and Tooth-Pastes.—On waking in the morning the mouth has been found to contain about 3000 million bacteria capable of being removed by a fivefold rinsing with 25 ccm. of water each time. After ordinary washing of the teeth with a hard tooth-brush, about one-fourth the number could still be rinsed away. After using, on another occasion, a tooth-paste containing one of the germicidal essential oils which have a very high phenol coefficient, 120 million only were left.—E. C. BOUSFIELD, *Lancet.*

Sharpening Burs.—The bur to be sharpened is placed in a hand vise, and with an oiled knife-edge Arkansas stone the sharpening is begun on the part of the cutting blade nearest the shank of the bur, pushing the stone upward and downward, and following the curve of the blade. This is repeated several times on each blade, and when completed the bur is tested by slowly revolving the blades over the thumb-nail with the right hand. If sharpened enough, the bur will catch in the thumb-nail, indicating the proper edge.—A. W. BARK, *Odontologist.*

Method of Disinfecting a Tooth with Dead Pulp.—An easy method of disinfecting a tooth with a dead pulp and to reduce severe pain in inflammation due to acute periodontitis, when the pulp chamber and canals are not filled, consists of the following: The cavity is washed out and dried. A pledget of cotton is saturated with tincture of iodin, and to it a large ball burnisher made quite red hot is applied. This will cause the vapor of the iodin to permeate the root-canals, and if applied three times a day should reduce the acute pain and also stay the inflammatory process, if this have not advanced too far.

The same method can be used to disinfect roots before opening, adding a very small quantity of formaldehyd solution to the iodin.—E DUNN, *Garretsonian.*

Preserving the Sharpness of Burs in Sterilizing.—In order to preserve the sharpness of the cutting edges of burs in sterilizing, the burs should never be boiled, as boiling dulls them. If they are cleaned by simply brushing them with soap—tincture of green soap being preferred—and water, dipped in boiling water, and placed in a receptacle containing alcohol, they are sufficiently sterilized for use. Since the instruments used in delicate eye operations are sterilized in this manner, it seems that this procedure is applicable to dental burs.—A. W. BARK, *Odontologist.*

Making Perfectly Fitting Clasps.—Ill-fitting clasps are the cause of many troubles in sound teeth, as we all know; therefore a perfectly fitting clasp is a most important factor in the making of a satisfactory denture. The first essential is a perfect model of the tooth to be banded, and this should be obtained from a plaster impression. A piece of thin tin foil is burnished around the tooth, and on it a piece of thin wax plate is pressed, and trimmed up with a sharp knife to the desired breadth and shape; the band and foil are removed together from the tooth, the foil is peeled off, and the piece invested and cast in the usual way, using band gold. In this way a perfectly fitting clasp is obtained, which conforms to the contour of the tooth.—P. S. HUMM, *Brit. Journ. of Dental Science.*

Sectional Impression for Difficult Cases.—Probably the most difficult cases are those where one or two teeth have been lost on either side, with much absorption of the alveolar process, and the remaining teeth are elongated. By a sectional impression these difficulties are readily overcome. Suppose a case in which the lower incisors, a left molar and bicuspid, and a right molar have been lost, with the posterior molars tipping forward. A small mass of modeling compound is pressed with the fingers into each space and held until it is stiff, but not entirely hard; it is then withdrawn to make sure that it will come out, and replaced. These pieces of modeling compound should slightly overlap the adjoining teeth. Then a fourth and fifth piece of compound is pressed between and overlapping the first three pieces. The latter being hard, it will not unite with them. On withdrawing the five pieces, putting them together will be found easy, and a correct model is obtained. No tray is used.—D. W. BARKER, *Dental Summary.*

Repairing a Broken Richmond Crown Pin.—If the pin is broken off at its base, the remainder is drilled out, and another pin is fitted in position and soldered as usual. If the pin is broken in halves, a piece of thin platinum is rolled around the stump to make a tube, removed from the stump, and with a broach, one-third of the tube is filled up with wet whiting or plaster. In the remaining two-thirds, tiny pieces of solder are placed and run in the flame. A solid pin is thus obtained, except for one-third, and into this part goes the broken stump. The crown is invested as usual, the tube placed in position, and soldered. The result is a solid pin, which can be filed down or manipulated as required.—P. S. HUMM, *British Journ. of Dental Science.*

Bacteriology of Tooth-brushes.—It is claimed by Smale and Jones that a toothbrush becomes septic after one using, each hair becoming an inoculation needle, and the person using it may be vaccinated with such germs as flourish on it. The tooth-brush, therefore, as popularly used—namely, for many months—may be the origin of pyorrhea alveolaris, which may lead to such grave consequences as anemia, gastritis, and arthritis. The prevalent tooth-powders and tooth-pastes as usually used do not render the tooth-brush aseptic, and even a solution of 1: 20 carbolic acid is not effectual. The authors insist that all tooth-brushes should be boiled for five minutes before and after use. A new toothbrush can be used each day. Those wishing for a more prolonged use of a tooth-brush can rinse the brush in tricresol (1 per cent.), or allow it to stand between use in formalin (10 per cent.).—*British Medical Journ.*, per *Journ. of Amer. Med. Association.*

Regulating Inlocking Upper Centrals or Laterals.—One of the most common irregularities noticed at an early age is the inlocking of upper centrals or laterals, frequently due to the excessively prolonged retention of the deciduous teeth. Treatment should be instituted as soon as possible, and the tooth or teeth moved into proper alignment. This movement may be effected in various ways. A jackscrew may be used, having one end attached to the permanent molar and the other to the lingual side of the tooth to be moved; or a spring of German silver wire may be employed, having one end attached to the molar and the curved end fitting under a lug on the lingual side of the tooth to be moved; or an alignment wire may be inserted, and by means of rubber bands or wire attachments the inlocked tooth or teeth may be drawn to place. The teeth being moved so as to occlude outside the lower ones, the trouble is at an end. The alignment wire, being outside the arch, is less cumbersome to the patient, and is perhaps preferable in cases where two or three teeth are moved, and which require some time for correction. It is also useful where centrals or laterals overlap. A collar tube soldered to it can be cemented to the overlapping tooth, and with the aid of a spring held by an alignment wire, rotated into place.—W. J. HILL, *Dominion Dental Journal.*

The Faucial Tonsils and the Teeth.—The faucial tonsils and the teeth are in close approximation, and they are alike subject to disease or degeneration. Diseased tonsils and teeth are locally and systemically unhygienic. Secretions from the tonsils may infect the teeth, and contrariwise, the tonsils may be infected by the teeth.

Diseased tonsils and teeth are locally and systemically unhygienic, and they become a direct source of infection to the glands of the neck and through the efferent lymphatics to the general respiratory and circulatory system. Hypertrophied faucial tonsils often become so large as to affect the hearing, the circulation of blood, the nerve supply of the face and head, and the normal development of the alveolar arches.

The teeth serve important purposes, but the exact function of the tonsil has not yet been demonstrated. The importance of preserving the teeth is fully recognized, but the diseased tonsil is not worth preserving, because it has lost its usefulness and become a menace to the human economy. The only safe and rational remedy for diseased faucial tonsils is total extirpation.—J. H. MAKUEN, *Dental Summary.*

Oral Hygiene Among the Somali Tribe.—It is stated that 90 per cent. of the children of London have decayed teeth, and it is an admitted fact that in all civilized countries the majority of people suffer from bad teeth. In India, Africa, and other parts where people live on simple diet, only a small minority have defective molars. For instance, there are some hundreds of natives at the "White City," Shepherd's Bush, and inquiries have elicited the astonishing fact that between them they do not possess a dozen bad teeth. Even the aged men and women have better preserved teeth than many a London child. The members of the Somali tribe are noted for their big and strong teeth, which glisten like pearls. The chief of the

Somalis informed a press representative that they never use tooth-powder, but constantly rub their teeth with a little piece of stick. When in their infancy, the children are made to use these pieces of wood several times daily, and eventually it becomes a habit. They are to be seen in their kraals in the Somali village diligently plying the spongy stick, regarding it as a kind of pastime—and their teeth are beautiful. "We have strong teeth and keep them many years," the chief said, "because we are always polishing them; we never eat sweets; we do not like sweet things, and we are very particular as to our diet. In Somaliland we eat no bread, but have rice instead. Dates, milk, and mutton are the other staple foods. My advice to parents is to make their children clean their teeth with a piece of stick several times a day."—*Dental Surgeon.*

Alveolar Abscess, Plastic Operation for Naso-oral Fistula, and Operation for Mandibular Necrosis.—Dentists should realize the seriousness of the most frequent operation they perform, namely, that of devitalizing and extracting pulps, since infection and serious bone destruction originate from this cause.

Destruction of the bony floor of the antrum does not necessarily mean perforation of the membranous floor or infection.

An alveolar fistula leading into a cavity where a considerable portion of a tooth is exposed requires extraction of this tooth before complete recovery can be expected.

Persistent headaches and general reduction in health are frequently caused by very insidious alveolar abscesses.

In destruction of the mandible requiring removal of bone, it is advisable to establish drainage through the chin and approximate the gingival margins with sutures so as to shut off a pus cavity from the oral cavity.

Naso-oral fistula may be closed by a membranous flap from the roof of the mouth.

In all suppurative conditions of the mouth pure tincture of iodin should be used as a disinfectant.—S. L. McCurdy, *Dental Summary.*

Advantages of Dental Instruments of Tantalum.—The following properties make tantalum specially suitable for dental instruments. This metal is very tough, without any tendency to bend; chemically and mechanically stable, so that it can be easily sterilized and is not liable to rust, and is capable of acquiring a high polish.

With the introduction of silicate fillings it became necessary to find some substance suitable for their manipulation in the cavity, the use of steel instruments being excluded owing to their staining effect on the filling, platinum and gold acting in a similar manner in a lesser degree. Ivory and bone were then used, but were difficult to clean quickly, lost their smooth surface, and became porous and gritty. It was also extremely difficult to get the instruments sufficiently thin for use in interstitial cavities; the latter difficulty was overcome to some extent by the use of tortoise-shell, but this quickly got out of shape and lost its smooth surface. Tantalum, in addition to being absolutely unaffected by acids, is capable of being shaped into any desired form, of retaining that shape when subjected to pressure, as in manipulating the filling, of being formed into an extremely thin and rigid blade suitable for spatulation, this blade being able to take a keen edge for the purpose of trimming up the hardened filling.

For the preparation of nerve-canal reamers, cleansers, etc., tantalum again seems to be the exact metal required, being able, if manufactured in the manner just stated, to acquire a very sharp edge of great smoothness and to retain this fine edge for a long time.—H. R. Shapland, *British Dental Journal.*

Relief of Facial Neuralgia.—Taptas, a visiting physician to the hospitals of Constantinople, describes in *Presse Médicale* his method of treating facial neuralgia, which he maintains is invariably successful and marred by no drawbacks. He has treated six patients in this manner, five with intense neuralgia of the mandible, one with the same affection of the maxilla. One injection of eighty per cent. alcohol with a trifle of menthol and one of the common local anesthetics sufficed to cure permanently all these cases, in some of which there were slight sensations of malaise immediately following the injection. Paptas introduces his needle into the space formed by the zygomatic arch and the sigmoid notch of the mandible, slightly inclining it from below upward; following the lower surface of the greater wing of the sphenoid, at a depth of four and one-half centimeters, he finds the foramen ovale. Care is required to avoid the Eustachian tube on one side, the pterygoid ridge on the other, and the pharynx below. A preliminary injection of 1:200 solution of cocain is useful. Once the needle is in the foramen, the patient is asked to open the mouth widely, when, the external end of the syringe being lowered, the needle is pushed forward into the Gasserian ganglion. Taptas recommends preliminary practice with the skull. An interesting complication that may follow the relief of the neuralgia is anesthesia of the cornea. This demands warning the patient to avoid carefully any irritation of the eye, which is greatly to be feared just on account of the anesthesia. The oculomotor nerve may be paralyzed after the injection, but this effect is temporary.—*New York Med. Journal.*

Time of Exposure and Use of Intensifying Screen in Dental Radiography.—The time of exposure for radiographing upper third molars is slightly longer than for any other teeth of the same mouth, but the difference is only a matter of two or three seconds.

Age increases the density of bone, and so the time of exposure necessary to make radiographs will be somewhat proportionate to the age of the patient.

The time of exposure can be shortened from one-half to four-fifths by using an intensifying screen. An intensifying screen is a piece of paper, cardboard, or sheet metal, covered with calcium tungstate, or platino-barium cyanid.

The coated side of an intensifying screen is placed against the coated side of the film or plate, and both screen and film are placed in the light-proof packet as usual. Thus we get a double action on the film when it is exposed—the action of the X rays themselves and the action due to the fluorescence of the intensifying screen.

When using an intensifying screen the uncoated side of the film should present toward the object being radiographed. This is contrary to the rule that to obtain the best results the coated side of the plate or film should present toward the object to be radiographed.

The advantages of the intensifying screen are: (1) Just in proportion as it reduces the time of exposure it protects both patient and operator against any ill-effects of the X rays. (2) By shortening the time of exposure the life of the tube is lengthened; from a financial standpoint this is of importance. (3) By using an intensifying screen one is able to do tolerably rapid work even with a very small coil.

The disadvantages of the intensifying screen are: (1) It causes a granular appearance of the negative, blotting out detail. (2) It is liable to spot the negative, due to unequal fluorescence of its surface. (3) It fluoresces for a minute or so after exposure, and if the plate and screen do not maintain their exact relation to one another blurring of the negative results. (4) Unless one owns several screens, so that a number of packets may be made at a time, their use necessitates the making of a film packet before each exposure, which is discommoding.

Such grosser lesions as an impacted tooth, for example, can be radiographed satisfactorily with the intensifying screen, but when we wish to obtain detail, such as is necessary to observe pulp-stones or a necrotic condition, for example, the use of the intensifying screen is contraindicated. An intensifying screen disintegrates with use.— H. R. RAPER, *Items of Interest.*

HINTS, QUERIES, AND COMMENTS.

TO REMOVE GOLD CROWNS, ETC.

To remove gold crowns, whether attached to a bridge or alone: Take a separating wheel and cut the lingual surface of the crown from the morsal surface nearly to the cervical margin. Prize the slit open with a small chisel, then place the chisel under one side of the crown where slit, near the morsal surface, and it will almost fall off.

To repair the same: Clean, invest, and heat, afterward packing the slit with filling gold. Place under the blowpipe, and solder. The advantage of this method is that since the cervical margin of the crown is not cut through as when using a crown-slitter, no bending of the crown is necessary, nor is there a possible enlargement of the cervical measurement of the crown.

To remove Melotte's metal from gold: Place in nitric acid, full strength, for about four hours.

To cleanse the hands from laboratory grime: Soak the hands in fairly hot water containing about two tablespoonfuls H_2O_2 to about one quart of water, washing with soap and brush.

Louis Englander, *Surg.-Dentist.*
Philadelphia, Pa.

"SPRINTING" AS A CURE FOR MOUTH-BREATHING:

With a Nasal Challenge.

To the Editor of the Dental Cosmos:

Sir,—Volumes have been written and much valuable time spent exploiting the evils of mouth-breathing. Then *why* breathe through the mouth? Many years ago the writer was a mouth-breather, but can truthfully say that for thirty-five years, under the most desperate conditions of acute colds, influenza, etc., his mouth has not been used for the purpose of breathing twenty minutes consecutively in that time.

We know that the trained athlete develops his muscles by exercise; but how can we exercise the muscles that control the nasal canals?

Here's *how:* Make a dash in the open air, with mouth closed—ten, twenty or fifty yards, or until you think you cannot make another leap without opening the mouth, then stop and fight it out *with the mouth closed,* until you again breathe normally. Keep this up regularly two or three times daily for from two to four weeks, and presto! you have a regular "biceps" in your nose. No, not for *size,* but for power and function. Now, my nose is no freak; it is normal in size and color, and for *function* I would be willing to put it alongside of anybody's nose.

In my youth I was no philosopher, no Ben Franklin with a three-decker brain crowded with great thoughts, poking lightning out of the clouds and the like, but I did read the health articles in the *Youth's Companion,* that admirable journal for the young—and the old. Hundreds of my mouth-breathing patients have heard the story, and it is with the hope that all who read these lines may pass it on to their hundreds of mouth-breathing clients, especially the young, that I write—to the end that there may be less cutting, digging, scraping, and drugging of delicate tissues, and that our youthful patients may enjoy better health as a result of natural breathing.

Geo. E. Smith.
Byron, Ill.

OBITUARY.

DR. GEORGE ALBERT BOON.

Died, in Norwich, Conn., November 12, 1911, of Bright's disease, in his thirty-ninth year, Dr. George Albert Boon.

George Albert Boon was born in Worcester, Mass., on July 28, 1873, and, after his family had moved to Norwich, Conn., received his early education in the schools of that city, and in those of New London, Conn., where his parents lived from 1886 on. In June 1891, after being graduated with honors from the Bulkeley high school, the deceased entered upon dental pupilage with Dr. Richard W. Brown, one of New London's oldest and best known dental practitioners, remaining associated with him for eleven years. For three years following he practiced dentistry in New York and Albany, and then returned to Norwich, where for seven years he conducted a lucrative practice until his demise.

On July 6, 1904, Dr. Boon was married in New York to Minnie Bell of Middlesborough, England, who survives him.

Dr. Boon was a member of many fraternal organizations, an active church member, and ardent political worker. He possessed qualities of mind and heart which attracted and retained to him many friends. His sympathies were quickly and generously given, and his heart and hand were open to help to the full extent of his ability. His genial, kindly disposition rendered him a welcome companion in the many circles with which he was associated. His sudden demise is mourned by his many friends, his fellow citizens, and his professional brethren.

Brief Necrology.

Dr. Wladyslaw L. Rybstat of Chicago, Ill., on October 31, 1911.

Dr. Henry M. Cook of St. Joseph, Mo., on November 4, 1911, of paralysis.

Dr. Lon F. Brine of Boston, Mass., on November 9, 1911, in his forty-ninth year.

Dr. J. P. Wood of Amarillo, Texas, on October 27, 1911, by accidental drowning.

Dr. J. D. Murphy of Bushnell, Ill., on November 14, 1911, in his sixty-first year.

Dr. Henry C. Bullock of Hartford, Conn., on November 23, 1911, of blood-poisoning and pneumonia, in his sixty-sixth year.

Dr. Hammett X. Gale of Baltimore, Md., on November 7, 1911, of heart trouble, in his fifty-ninth year. Deceased was a graduate of the Baltimore College of Dental Surgery, Baltimore, Md.

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SOCIETY NOTES AND ANNOUNCEMENTS.

"TRANSACTIONS" OF THE FIFTH INTERNATIONAL DENTAL CONGRESS.

Official Report of the Berlin Meeting Open to Purchase.

The mailing of the official Report of the Fifth International Dental Congress, Berlin, August 23–28, 1909, to members, has taken place. Some copies left for disposal after the members have been supplied are offered at 25 marks per copy as long as the stock may last.

This publication consists of two volumes, containing 1414 pages of printed matter, with over 700 illustrations, and practically constitutes an exposition of modern scientific dental surgery.

Orders are requested to be sent as soon as possible, with names and addresses attached, to the publishers, Schmitz & Bukofzer, Berlin C., Rosenthaler Strasse 26.

For the Organization Committee,

Shaeffer-Stuckert, *General Sec'y.*

CANADIAN DENTAL SOCIETY AND ONTARIO DENTAL ASSOCIATION.

Union Meeting.

A union meeting of the Canadian Dental Society and Ontario Dental Association will be held at Hotel Brant, Hamilton, Ont., June 3, 4, 5, and 6, 1912.

J. A. C. Hoggan.

COMPLIMENTARY DINNER TO DR. W. W. WALKER

BY THE

FIRST DISTRICT (N. Y.) DENTAL SOCIETY.

A complimentary dinner will be tendered to Dr. Wm. Wallace Walker on the evening of Saturday, January 20, 1912, at the Hotel Astor, New York city. The dinner is given by the First District Dental Society of New York.

Dr. Walker has devoted himself for many years to the advancement of the interests of this society, and, in addition to inaugurating a very successful series of Post-graduate Study Sections, has also harmonized the conflicting society interests of the metropolis, by merging all the existing societies in the First District Dental Society, which therefore now includes the New York Odontological Society, the New York Institute of Stomatology, and the New York Institute of Dental Technique.

The committee makes this public announcement because they fear that some of the many hundreds of friends of Dr. Walker throughout the country may accidentally fail to receive an invitation. All who desire to be present are therefore requested to waive formality and send their acceptances at once to the treasurer, Dr. James W. Taylor, 106 East 57th st., New York, N. Y., inclosing the subscription price—ten dollars.

Safford G. Perry, *Chairman,*
Henry W. Gillett, *Sec'y.*

A Great "Dental Week" at Chicago.

CHICAGO DENTAL SOCIETY
AND THE
INSTITUTE OF DENTAL PEDAGOGICS.

The Chicago Dental Society has planned for a grand two days' celebration, January 22 and 23, 1912. This will be the forty-eighth annual meeting of the society. We will have clinics on both days.

[See "Outline Program."]

This society has attained a membership of almost 1200, and we propose to make this one of the greatest celebrations we have ever attempted.

The officers of the society are as follows: G. W. Dittmar, president; G. N. West, vice-president; T. L. Grisamore, secretary; F. E. Roach, treasurer, and E. D. Coolidge, librarian.

Manufacturers desiring space for exhibition purposes at the Chicago Dental Society's clinic and exhibit to be held in the College of Dentistry, University of Illinois, January 22 and 23, 1912, should apply at once, giving amount of space desired. Direct all correspondence to Chas. E. Jones, D.D.S., chairman of Exhibit Committee, Harrison and Honore sts., Chicago, Ill.

Fred W. Gethro.

The next annual meeting of the Institute of Dental Pedagogics will be held in Chicago, January 24, 25, and 26, 1912. (Notice change of dates.)

[See "Outline Program."]

Outline Program.

CHICAGO DENTAL SOCIETY.

Monday, January 22d.

All day: Manufacturers' exhibit.

Evening (8 o'clock)—Paper, "Comparative Dental Anatomy." Dr. William Bebb.

Tuesday, January 23d.

All day: Clinic—College of Dentistry, University of Illinois.

Evening (8 o'clock)—Paper, "Salivary Calculus." Dr. G. V. Black.

INSTITUTE OF DENTAL PEDAGOGICS.

Wednesday, January 24th.

9 A.M.: Address of Welcome by Mayor of Chicago.

President's Address. Dr. Donald M. Gallie.

Report of Master of Exhibits.

Report of Commission on Text-books.

Afternoon (2 to 5 o'clock)—Paper, "The Teaching of Comparative Dental Anatomy." Dr. William Bebb.

Evening (8 o'clock)—Banquet (hotel not yet selected).

Address by a prominent speaker of national reputation.

Thursday, January 25th.

9.30 to 11.30 A.M.: Visit Northwestern University Dental School.

Luncheon, 11.30 to 12 o'clock.

Automobiles to West Side.

Visit Chicago College of Dental Surgery, 1 to 3 o'clock.

Visit College of Dentistry, University of Illinois, 1 to 5 o'clock.

Evening (8 o'clock)—Paper, "The Teaching of Dental Histology." Dr. Fred B. Noyes.

Friday, January 26th.

9 A.M.: Paper, "The Teaching of Applied Physics and Chemistry." Dr. Marcus L. Ward.

Report of Commission on Nomenclature.

Report of Dental Index Bureau.

1.30 P.M.: Paper, "The Teaching of Clinical Pathology." Dr. H. T. Smith.

At the banquet on Wednesday, given by the three dental schools of Chicago, all teachers of dentistry outside of Chicago will be guests. The speaker for this occasion has not been definitely decided upon, but he will be a man of national reputation, and the address will be on some subject other than dentistry.

The officers and committeemen for the two societies are making every effort to make these meetings the greatest ever held in our city. We are sure that the programs are of unusual merit. Clinicians from various parts of the country have been selected with great care and we have every reason to believe that this will be one of the most complete clinics we have ever given.

Fred W. Gethro, *Sec'y-Treas. I. D. P.*,
Chicago, Ill.

CHAPIN A. HARRIS MEMORIAL FUND.

The committee appointed by the Maryland State Dental Association in charge of the Chapin A. Harris Memorial Fund call your attention to the desire on the part of the dental profession to commemorate in a suitable manner their appreciation of the services rendered by this distinguished man in the effort to elevate the profession of dentistry.

While not a Marylander by birth, his lifework was accomplished in this state, which was his home, and it was in the city of Baltimore that he established the first dental school, thus making dentistry a profession.

Connecticut has recognized and honored the name of Horace H. Hayden, a co-worker with Harris, by erecting a handsome monument to his memory at Winsdor.

We are now asking contributions from dental societies, colleges, and members of the profession at large, to aid in erecting a suitable monument to the memory of Chapin A. Harris, the Founder of Professional Dentistry.

Those wishing to contribute will kindly send to Dr. H. A. Wilson, treas., Calvert Bank Bldg., Baltimore, Md.

W. G. Foster, *Chairman,*
W. W. Dunbracco, *Sec'y,*
M. G. Sykes,
B. Holly Smith,
T. O. Heatwole,
J. W. Smith,
H. A. Wilson, *Treas.*

PIEDMONT (S. C.) DISTRICT DENTAL SOCIETY.

The next regular tri-annual meeting of the Piedmont District Dental Society will be held in Piedmont, S. C., March 26, 1912. All of the time will be devoted to clinics with the exception of a short business meeting, at which anyone who wishes may ask the society such questions as, How do you treat abscessed deciduous teeth? or, How would you treat a tooth with a Richmond crown cemented to position with an abscess under it? etc.

Clinics will begin promptly at 9 A.M.

W. Busey Simmons, *Sec'y-Treas.*

G. V. BLACK DENTAL CLUB.

Abandonment of Annual Clinic.

It is with regret that the G. V. Black Dental Club of St. Paul, Minn., announces that it will be unable to hold its annual clinic in February 1912. Illness of some of the members, and of others whom we expected to help us, make it necessary for us to take this action.

R. B. Wilson, *Sec'y,*
206–8 Lowry Bldg., St. Paul, Minn.

SOUTH DAKOTA STATE DENTAL SOCIETY.

The thirtieth annual meeting of the South Dakota State Dental Society will be held at Sioux Falls, May 14 and 15, 1912. Adoption of a new constitution and by-laws will take place at this meeting.

J. D. Donahoe, *Sec'y,*
Sioux Falls, S. D.

KANSAS STATE DENTAL ASSOCIATION.

The forty-first annual convention of the Kansas State Dental Association will be held in the city hall at Salina, Kans., April 23, 24, and 25, 1912.

S. S. Noble, *President,*
Wichita, Kans.

ARIZONA DENTAL SOCIETY.

At the third annual meeting of the Arizona Dental Society the following officers were elected: W. P. Sims, president; W. A. Baker, vice-president; H. H. Wilson, secretary-treasurer.

H. H. Wilson, *Sec'y,*
Phœnix, Ariz.

ARMY DENTAL SURGEONS.

Memoranda of Changes.

For the week ending November 18, 1911:

R. E. Ingalls, November 1st, left Fort Douglas, Utah, *en route* to Fort Yellowstone, Wyo., for temporary duty.

Frank P. Stone, November 10th, reported for temporary duty at Jackson Barracks, La.

John D. Milliken, November 15th, leave of absence extended two months.

For the week ending November 25th:

R. E. Ingalls, November 3d, reported for temporary duty at Fort Yellowstone, Wyo.

Franklin F. Wing, November 15th, reported for temporary duty at Fort Mackenzie, Wyo.

For the week ending December 2d:

[No changes.]

For the week ending December 9th:

Jno. A. McAlister, Jr., December 1st, relieved from duty at Fort Leavenworth, Kans., and ordered to Jefferson Barracks, Mo., for duty.

Hugh G. Worthington, December 1st, relieved from duty at Jefferson Barracks, Mo., and ordered to Fort Leavenworth, Kans.

Frank P. Stone, December 2d, reported for temporary duty at Fort Crockett, Texas.

INDIANA BOARD OF EXAMINERS.

THE next meeting of the Indiana State Board of Dental Examiners will be held in the Capitol, Indianapolis, beginning Monday, January 8, 1912, and continuing four days. All applicants for registration in the state will be examined at this time.

No other meeting will be held until June, 1912. For further information apply to

F. R. HENSHAW, *Sec'y*,
507–8 Pythian Bldg., Indianapolis, Ind.

SOUTH DAKOTA BOARD OF EXAMINERS.

THE South Dakota State Board of Dental Examiners will hold its next meeting at Sioux Falls, S. D., January 9, 1912, at 1.30 P.M., continuing three days. All applications for examination, together with a fee of twenty-five dollars, must be in the hands of the secretary by January 1st. Applicants who have not complied with the above will not be permitted to take the examination.

For further information, blanks, etc., address

ARIS L. REVELL, *Sec'y*,
Lead, S. D.

UNITED STATES PATENTS

PERTAINING OR APPLICABLE TO DENTISTRY

ISSUED DURING NOVEMBER 1911.

November 7.

No. 1,007,824, to JAMES W. TROSPER. Dental pliers for holding teeth.

No. 1,007,864, to ERNEST S. GOLDY, Toothbrush.

No. 1,008,028, to HARRY A. GOLLOBIN and NEWTON A. BORNSTEIN. Removable bridge for teeth.

November 14.

No. 1,008,569, to ISIDORE STERN. Artificial tooth.

No. 1,008,845, to ADOLPHUS G. MEIER. Dental filling material.

No. 1,008,970, to JOHN J. KESSLER. Composite dental foil and process of making same.

No. 1,009,008, to WLADISLAW ASCH and DAGOBERT ASCH. Electric dental heater.

November 21.

No. 1,009,551, to GUY J. NATIONS. Dental appliance.

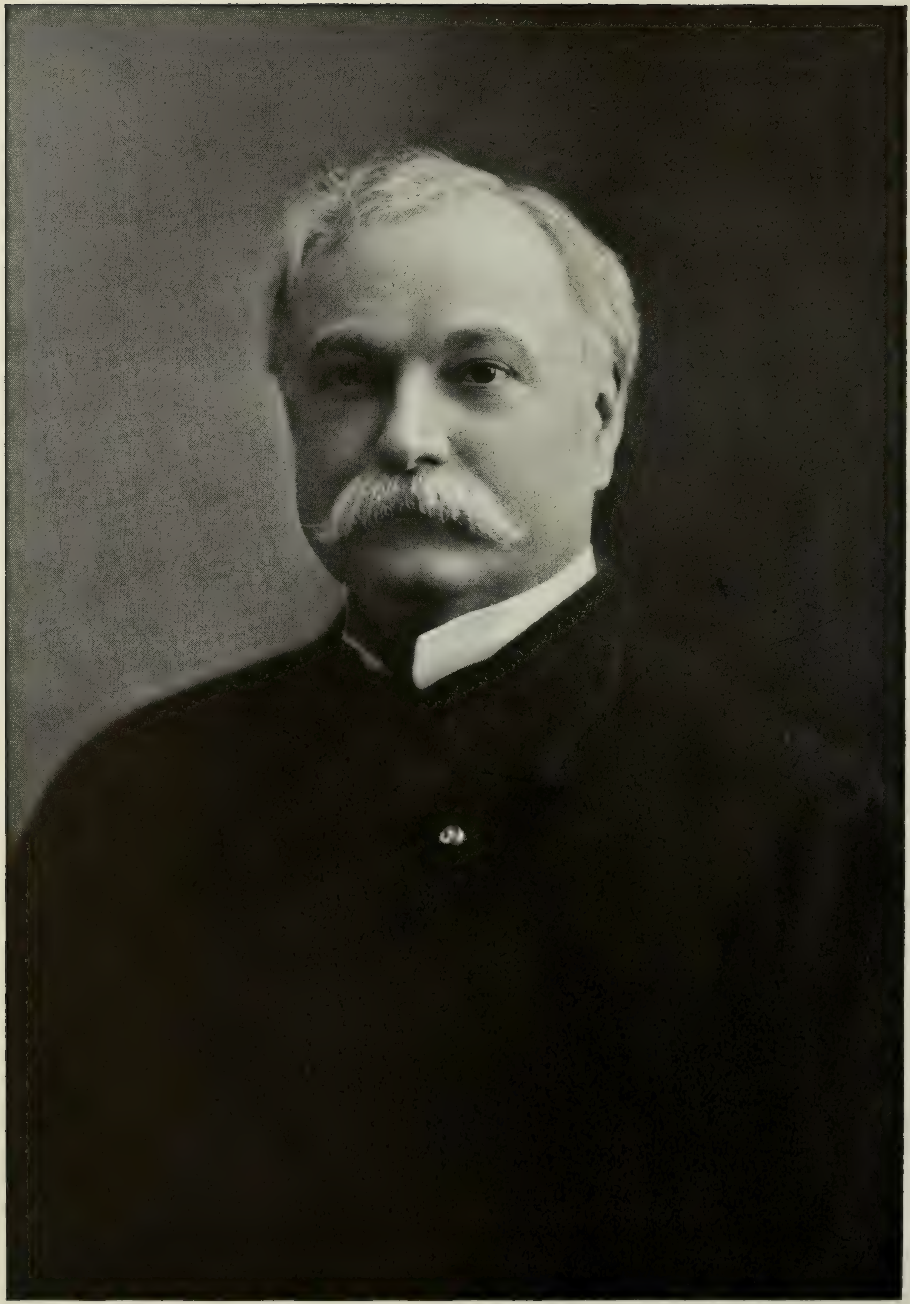
November 28.

No. 1,009,912, to CHAS. E. LUCE. Articulator for making artificial dentures.

No. 1,010,145, to JAMES W. IVORY. Dental cap crown slitter.

No. 1,010,146, to JAMES W. IVORY. Padholder for dental purposes.

No. 1,010,147, to JAMES W. IVORY. Padholder for dental purposes.



DR. SAFFORD GOODWIN PERRY.

THE

DENTAL COSMOS.

VOL. LIV. FEBRUARY 1912. No. 2.

ORIGINAL COMMUNICATIONS.

THE QUESTION OF EXTRACTION IN ORTHODONTIA.

By CALVIN S. CASE, M.D., D.D.S., Chicago, Ill.

(Read before Section I of the National Dental Association, at its annual meeting, Cleveland, Ohio, July 25, 1911.)

(I.)

IT is not intended by this essay to undervalue in the slightest degree the importance of the many valuable scientific papers which have emanated from the new school of orthodontia. The awakening of interest and investigation by many vigorous scholastic minds in this department of dentistry has given us a better understanding and appreciation of the importance of the teeth, their development in the individual, and the influence they exert in normal and abnormal relations upon associate bones of the human physiognomy.

No one can read Dr. C. A. Hawley's paper read before the District of Columbia Dental Society in 1910 and feel that he has not been instructed in regard to the co-ordinating forces at work between the teeth and the jaws. While I may not fully agree with all his tenets, as I do not agree with every claim and hypothesis of other writers, I gladly sift out the main portion, which I know to be true and valuable, and am grateful that we have men in the profession who are devoting their intellects and skill to the advancement of dentistry.

It is hoped that on this occasion at least my views will be answered in the same spirit of good-will with which they are being presented. It is only by threshing out differences of opinion that true progress is possible. No man is so great that his views are unassailable, and when he imagines otherwise, he is very liable to venture into the realms of the fantastic.

THE PROBLEM OF CAUSES AS GOVERNING IN ORTHODONTIA.

The question of extraction is so intimately bound up in the question of causes, that I hope to be excused if in the course of my paper I shall dwell at some length upon this phase of the subject, even briefly presenting a few associate principles of biology and ethnology.

It depends largely upon whether it is true or untrue that malocclusions of the teeth are due wholly to local causes, as proclaimed throughout the entire writings of the "new school," or whether they do not, partly at least, arise from the law of heredity and from other laws which govern the development of plants and animals, and especially to laws which govern the mixture of dissimilar types. If it be true, as is claimed, that the sizes and relations of the teeth and jaws and associate bones of the skull are intended to be in the individual in perfect harmony as if stamped by the Creator, and that when found to be otherwise, correction of the facial outlines is possible by the aid of artificial forces, with a preservation of all the teeth, then the extraction of sound teeth in orthodontic operations is certainly malpractice.

Upon no other basis but the Bible theory of special creation can I reconcile the teaching that nature never puts teeth into an individual's mouth that do not belong to his or her physiognomy, etc. While I should dislike to destroy or even weaken the theological belief of anyone who finds comfort in his religion, I feel that a question of such importance demands the whole truth from the advanced standpoint of evolution.

There seems to be a tendency on the part of many prominent writers in the field of orthodontia to attribute all the physical departures from the normal to degenerating or growth-perverting influences acting on the individual after birth, and that this is the only cause of malocclusion of the teeth. Moreover, the belief is quite prevalent among educated people who have not given special study to the principles of biology, that the variety of forms which we see about us in both flora and fauna has arisen through the propagation of physical variations that are produced in the individual by the influences of environment; and that this is the principal if not quite the sole force and method of evolutionary development. For this reason—they argue—local influences in the form of artificial stimuli can be made to accomplish a wonderful amount of overdevelopment in parts of individuals, regardless of the inherent form. Nothing could be further from the truth, as I will endeavor to show later by a cursory review of some of the basic principles of biology and ethnology.

RULES RELATIVE TO EXTRACTION IN ORTHODONTIA.

At the outset I wish to make it definitely understood in what proportion of cases as compared to the whole number of malocclusions we of the rational school of orthodontia advocate the extraction of teeth in the operation of correction. My object in doing so is—First, inasmuch as an essay of this character necessarily is based more or less extensively upon a large number of practical cases, a listener is quite apt to obtain the impression that we practice extracting for a far larger number and variety of cases than we really do. Second, since it is so common to find in print perverted and untruthful statements in regard to our teaching, I feel called upon at this time to endeavor to disabuse the minds of many who have thus been misled.

For many years I have repeatedly published in various wording the following rules relative to extraction in orthodontia:

"Never extract teeth for the purpose of making the operation of correction easier, for whatever the malocclusion the teeth can always—or with very few exceptions—be placed in arch alignment and in normal occlusion, and in a very large majority of all cases they are needed in the arches, not only to perfect occlusion but to aid in beautifying the facial outlines. Therefore, so far as the relations of the teeth to each other are concerned, no *dental* malposition should be taken as a basis for extraction."

"No teeth should ever be extracted in orthodontia except in cases of excessive protrusions producing decided facial deformities, or at least marked dento-facial imperfections—and not even then, especially in young children, unless there is every indication of an inherent protrusion that will ultimately mar the beauty of the face for life."

"In nearly all locally caused malocclusions in immature arches, the final development of the jaws and general growth enlargement of the features demand all of the teeth and their sustaining alveolar arches to harmonize the facial relations. Therefore in every case in which dento-facial protrusions can be corrected without extraction we should strive to produce a normal occlusion, not only for the sake of its more perfect masticating forces, but because of its normal developing influences upon associate bones. A very large proportion of protrusions which demand extraction for their correction arise from *inherent* causes, or from influences operating before birth, and not from local causes"—a theme of my subject which I shall refer to later.

RULES FOR EXTRACTION APPLIED TO THE ANGLE CLASSIFICATION.

Now let us see what proportion of cases come under the head of extraction in a conservative and what I am pleased to term a rational practice of orthodontia. In order to make my remarks as intelligible as possible to the largest number, I will adopt in this paper the dento-occlusal classification introduced by Dr. Angle, because it is the classification now generally accepted and consequently the one best understood. Moreover, it is the only rational classification for all who believe that in every case of irregularity the full complement of the teeth should be preserved, and when placed in normal occlusion will produce the only true facial result for that individual.

My objection to this classification has arisen from the fact that the occlusion or malocclusion of the buccal teeth gives no indication of the real position of the dentures in relation to facial outlines, which, after all, is the only true basis of diagnosis; therefore after determining the malocclusion and classifying it under the occlusal head, I would still have to find out "what's the matter," in order to apply the proper treatment.

Of the patients who apply for correction of malocclusion in my practice about three-fourths may be placed in Dr. Angle's class I, the buccal teeth being normal in occlusion disto-mesially, or nearly so. Out of this class of cases there is probably not more than one twenty-fifth —or about one case in thirty as compared with all cases of malocclusion—in which the slightest thought should be given to extraction. These are the decided bimaxillary protrusions, or protrusions of both the upper and lower dentures in relation to facial balance or dento-facial harmony of the individual. (See Fig. 2.)

I will show that even the most extreme forms of this type are not so very uncommon, producing decided facial deformities though the buccal teeth are in normal occlusion. When it is considered that this form arises in every gradation of dento-facial protrusion from the most extreme to the normal, it is time that advanced orthodontists cease to close their eyes to a recognition of its legitimate place in dental orthopedia.

In Dr. Angle's class II, or distal malocclusion as it is called by some orthodontists, the upper teeth are far in front of normal occlusion with the lowers, being commonly found in full mal-interdigitation. One type of this class arises in my practice in about every ten cases. About one-half the number of the cases do not present protrusions of the upper denture, except to a slight degree, but are characterized principally by a decided retrusion of the lower denture in relation to the mandible and the upper denture. (See Fig. 23.) It would be rank malpractice to extract teeth for the correction of this dento-facial type of malocclusion, as will be shown.

In the other half of this class, however, which is composed, first, of a variety of upper protrusions, the lower denture and mandible being normal, and second, those in which the lower denture and mandible are retruded, I will endeavor to prove that extraction is absolutely demanded if we aspire to attain to the most perfect result possible. (See Figs. 14 and 16.)

In this division of class II must be placed also one type of that most common of all irregularities, *i.e.* mal-eruption of the upper canines. This is characterized by a decided protruded malocclusion of the upper buccal teeth in relation to a normally posed lower denture, showing that this type belongs to the common inherent type of protruded upper teeth which demand extraction. (See Fig. 1.)

In Dr. Angle's class III, or "mesial malocclusion" as it is termed, there is only one type of the many distinct characters of this class for which extraction is demanded. This type is characterized by a decided protrusion of the lower denture in relation to the mandible, which is accompanied usually by the common retrusion of the upper teeth. The only way in which the deformed facial protrusion of the lower lip can be corrected is by extraction. This type is so rare, however, that it can hardly be counted. (See Fig. 24.)

To sum up the number of cases in which teeth are extracted by all skilled rational orthodontists as compared to the whole number of cases presented for treatment: there arises about one case in thirty or thirty-five in Dr. Angle's class I, and in his class II about one case in every twenty, making, on the whole, only about one case in every twelve or fifteen. But, few as these cases are, this method of treatment should not be ignored by any orthodontist who strives for the highest attainment of his art. Moreover, I will show that this method of treatment pertains to those particular cases which cannot be more than partially corrected without extracting, and which, when corrected in that way, are by all odds the most difficult to retain, with the almost certain probability of ultimately stamping a most unhappy facial deformity for life upon the patients.

The fact, also, that almost every orthodontist after four or five years of experience in practice as a specialist resorts to extraction in the correction of these cases, however enthusiastic he may have been at first over the unvarying and arbitrary normal occlusion theory, is *prima facie* evidence that this is the true principle of practice the application of which we owe not only to our patients, but to ourselves, in an honest skilful effort to perform the most practical and beneficent service.

Class I.

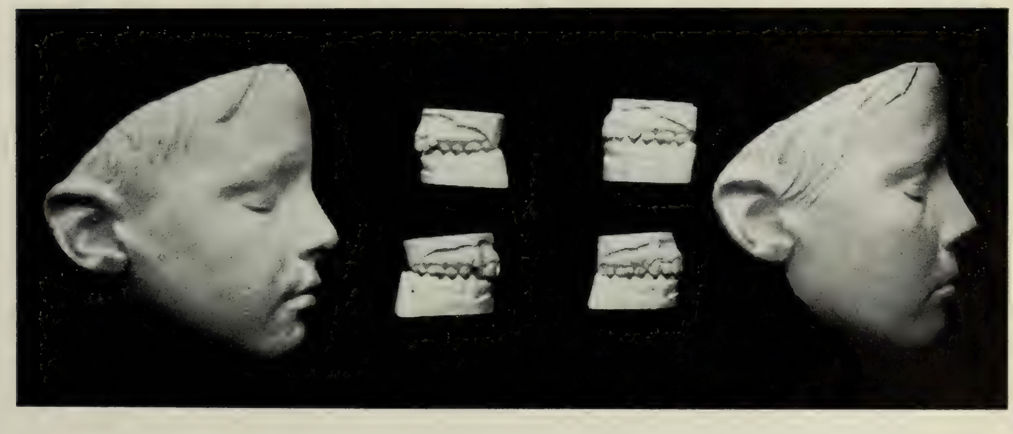
The fifteen marked cases of bimaxillary protrusion shown in Figs. 2 and 5 have arisen in my practice within the past eleven years; five of these have presented within the last four years, this being their first entry to publication. Notwithstanding the fact that these cases are characterized by a normal occlusion of the buccal teeth, and that in nearly all cases the labial teeth are in comparatively typical relation, the most pronounced of all dento-facial deformities is to be found in this type.

This personal record of the marked cases of this character, however, hardly begins to represent the comparative number of these cases found among the mixed types of the white race. An observing expert at quick diagnosis of facial outlines will see them everywhere, in the cars and crowded thoroughfares of cities, with physiognomies characterized by protruding mouths and receding chins. The reason why these individuals do not seek us more often for correction, though they may be perhaps embarrassingly conscious of their imperfection, is that most of them do not imagine that any correction is possible. Moreover, their dentures are so frequently in normal occlusion that even dentists whose thoughts are engaged in saving teeth, upon seeing these seeming perfect relations, give little thought to the facial effect which the dentures produce; or, if they think of it at all, they regard these patients as more or less exceedingly homely, as God or inheritance made them. The same is true of many modern orthodontists who would not consider for a moment the extraction of teeth from mouths in which the dentures are already so nearly or quite in normal occlusion, and who will doubtless tell you that all that is necessary in these cases is to widen the arches and retrude the front teeth. While this might result in a partial improvement in the facial outlines, the teeth always remain in unpleasant evidence, with an awkward strained management of the lips, and in a very large proportion little or no correction is possible in that way. The pity is, that this condition could often be wholly corrected by a more rational treatment, leaving every power necessary for mastication.

I doubt if this type is recognized by the new-school orthodontists as belonging among marked "malocclusions," nor does it, in the sense in which that term is employed, because the teeth are so often in normal occlusion, as shown in similar types of negro skulls (one of which is frequently employed to illustrate a typically normal occlusion), and consequently the term malocclusion, when applied to these cases, is somewhat of a misnomer. Yet if there is any type in dental orthopedia which demands extensive correction when it occurs in the white race, it is this.

When these cases present for treatment, especially, as they frequently do, after the eruption of the second molars, with the teeth crowded closely together in arches of nearly or quite normal width, with receding chins, and decidedly protruding lips which are closed with difficulty over the protruding dentures, will the gentlemen who have been chosen to discuss this paper tell me how they can possibly correct the facial outlines of these patients by an orthopedic movement of the teeth without extraction, and produce anything like the results which I shall show? Will they further explain why in cases of the teeth crowded in jaws that are unquestionably too small to contain them in alignment, filling the jaws more than full from the tuberosities and rami forward, and also having had from the very start of their occlusion all the advantages claimed for the developing activities of a normal occlusion—why in *these* cases the maxilla and associate bones have not been stimulated to that newly found process of "bone-growing" to at least such an appreciable extent as to partially harmonize the relationship of the facial outlines?

FIG. 1.



From my viewpoint the reasons therefore are as follows: The teeth and jaws, in their inharmonious sizes and relations, have arisen according to the law of heredity, through the union of dissimilar types, or from the propagation of variations; also because it is not an established law of biology—as has been claimed—that the bones can by natural or artificial forces be made to grow larger or longer than their inherent sizes, else this possibility would have come to light long ago in the watchful breeding by artificial selection. I shall have more to say upon this theme later.

The group of cases illustrated in Fig. 2 has been previously published, but I cannot refrain from calling especial attention to two cases of this group, because they are so germane to the subject.

Fig. 2.

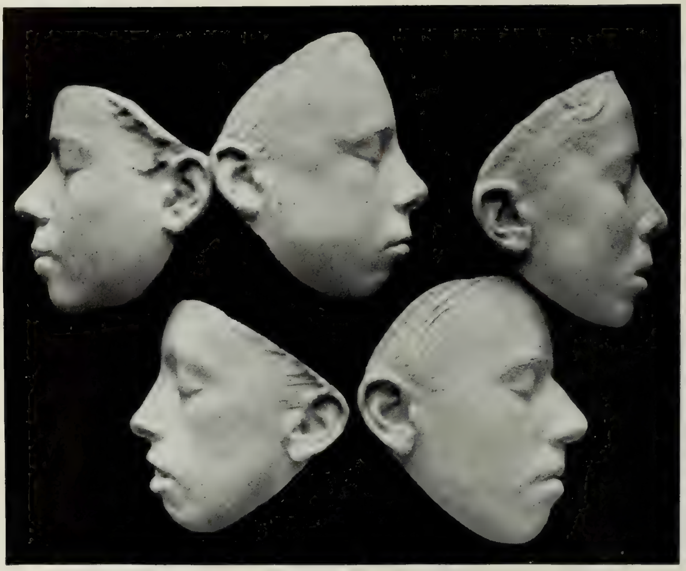
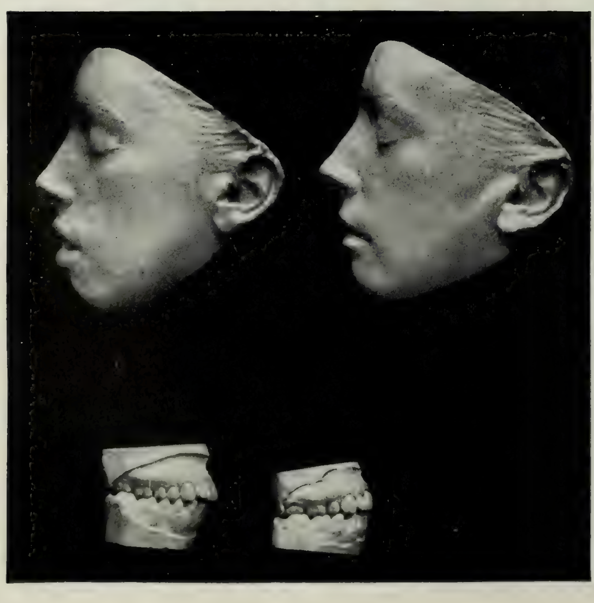


Fig. 3.



In the case shown in Fig. 3, the dentures, with the exception of a slight malposition of the upper right lateral, were almost perfect in occlusion, arch width, and alignment, and notwithstanding that four teeth were extracted as shown, followed by the application of the most scientific methods of correction, the dento-facial protrusion is still not wholly reduced. Think what misfortune marred this patient's girlhood because she did not receive proper treatment until after twenty years of age, largely because her occlusion was normal!

The one case in this group in which the front teeth were in marked mal-alignment is shown in Fig. 4. It will be seen by carefully examining the original facial cast that the upper lip is but slightly protruded, which is explained by a glance at the overlapping malpositions of the upper front teeth contracting the arch. If the front teeth had been placed in arch alignment with a preservation of all the teeth—the buccal teeth being already in normal occlusion—could the result have been any other but a further protrusion of the already protruding lips, with an increase of the receding chin effect? Upon examining the finished faces as they appeared after treatment—one of which is reproduced from a photograph—it appears as if there had been a forward growth of the mandible because of the greater prominence of the chin and the almost perfect dento-facial outlines, but I can aver that this is wholly due to retruding the dento-facial area, made possible by the extraction of the four first bicuspids. Soon after completion of the operation, the young man was graduated from Princeton College, and because of his somewhat phenomenal academic ability and brilliancy, received from the United States government an important diplomatic appointment abroad. As this appointment necessarily entails exacting social functions and relationships, the difference between the two methods of correction was of the greatest importance to this patient, since treatment without extraction would have left him with a protruding mouth, prominent teeth, and a receding chin, while the result of the other treatment is characterized by comeliness, self-poise, and intellectuality.

Fig. 4.

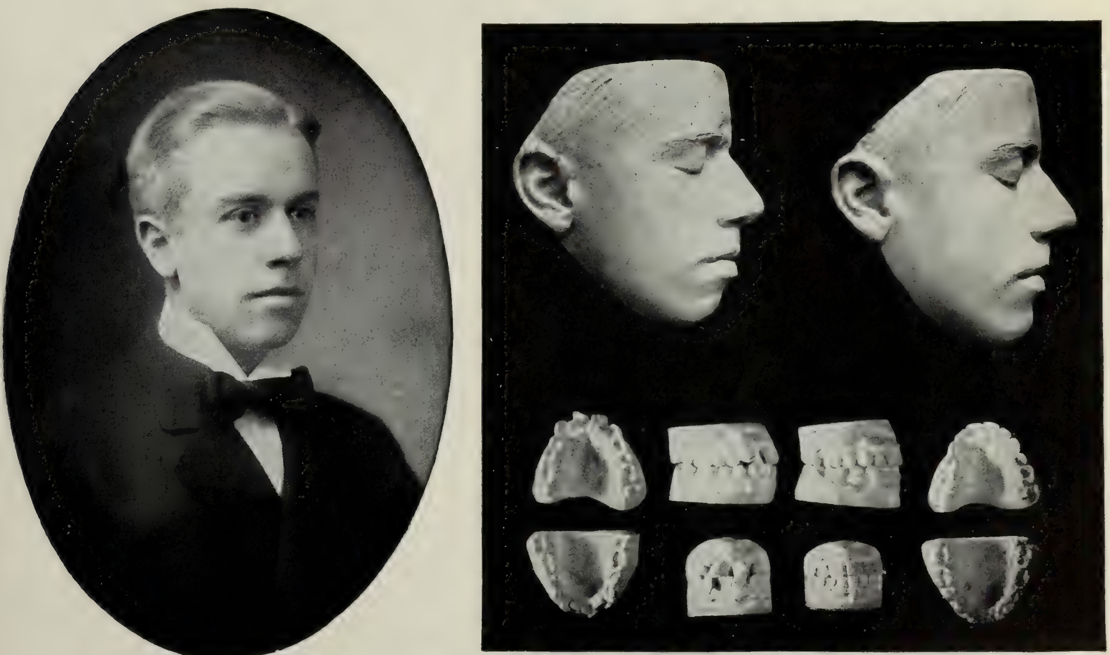


Fig. 5 is another group of bimaxillary protrusions which have been treated in my practice in the last five years. They present the same marked characteristics of physiognomy as the former group.

Fig. 6 illustrates the same normal relations of the buccal teeth as shown in Fig. 3.

FIG. 5.

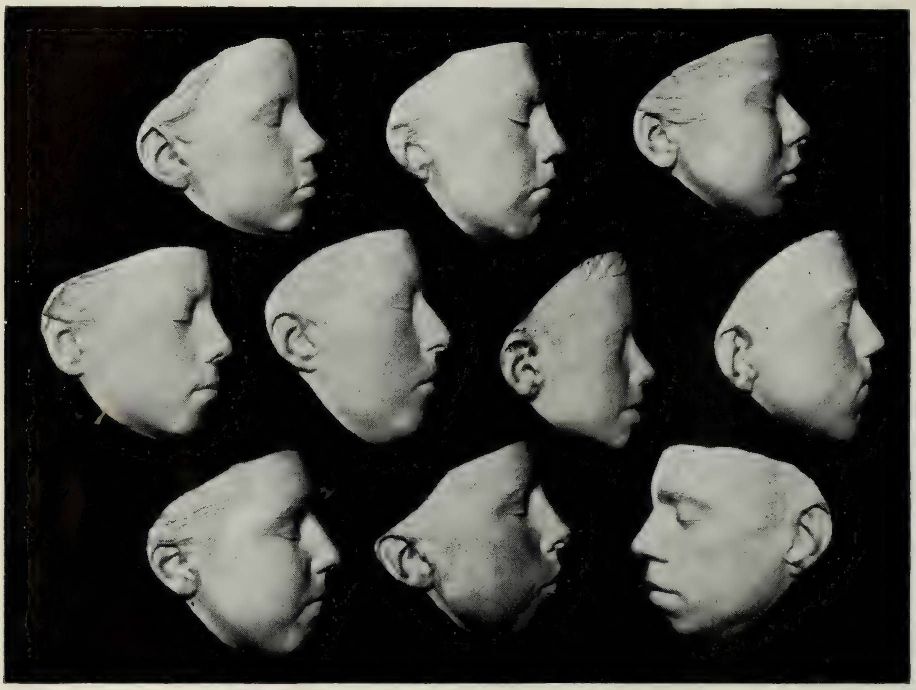
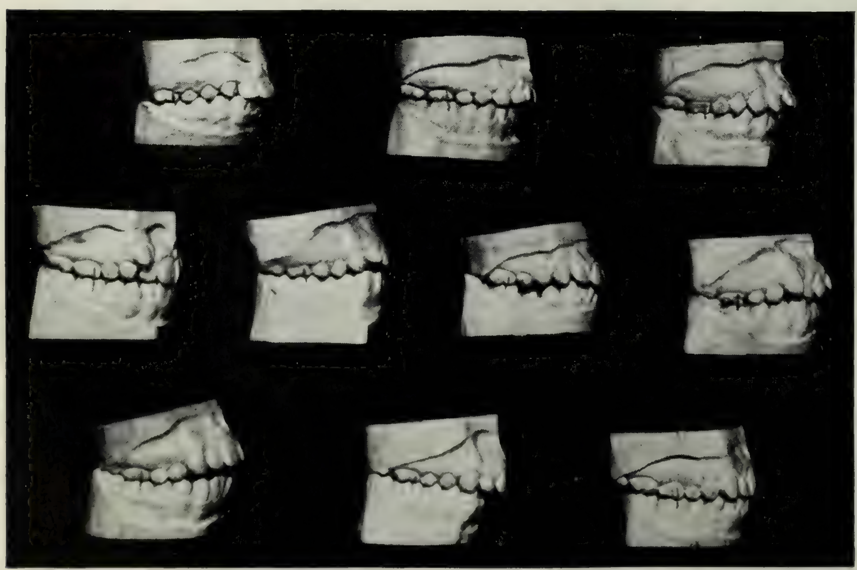


FIG. 6.

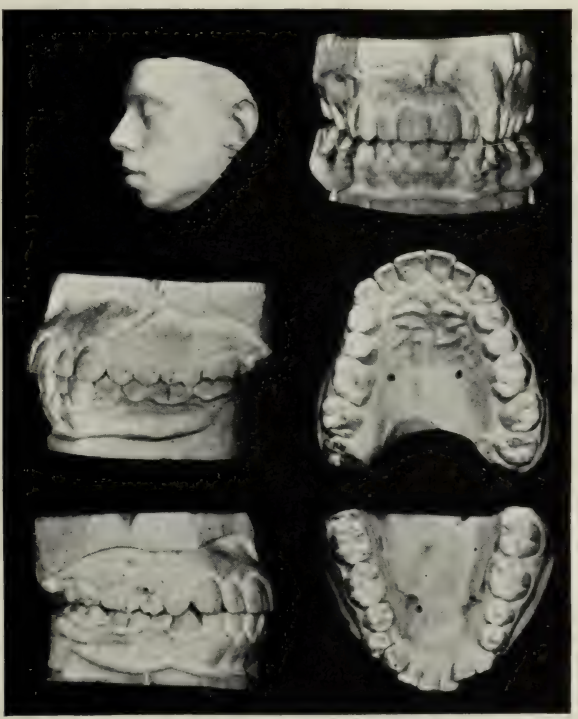


I wish particularly to call attention to one of these cases, the casts of which were made before I referred it to my college associate for correction. (See Fig. 7.) With the single exception of a slight malposition on the right side, the occlusion of the teeth is almost ideally normal, that is, it is more perfect than the normal occlusions that are the most common. But when we compare this occlusion with the physiognomy, is it not strange that competent, earnest men will continue to insist that—"A normal occlusion is incompatible with abnormal facial outlines?" They may also continue to insist —for some time—that such dento-facial malrelations arise from local causes, if they acknowledge that they exist at all except as "freaks." But is it not asserted in ethnology that there is an unbroken gradation between different facial types, which includes this very type? Will these men therefore tell me where freaks begin and the natural condition ends?

In regard to the other way of stating this mathematical rule—"Malocclusions are incompatible with normal facial outlines for the individual"—I wish to call your attention briefly to Fig. 8. The face on the left is one of those which appeared in the first group of bimaxillary protrusions; that on the right has the appearance of a typical bimaxillary retrusion.

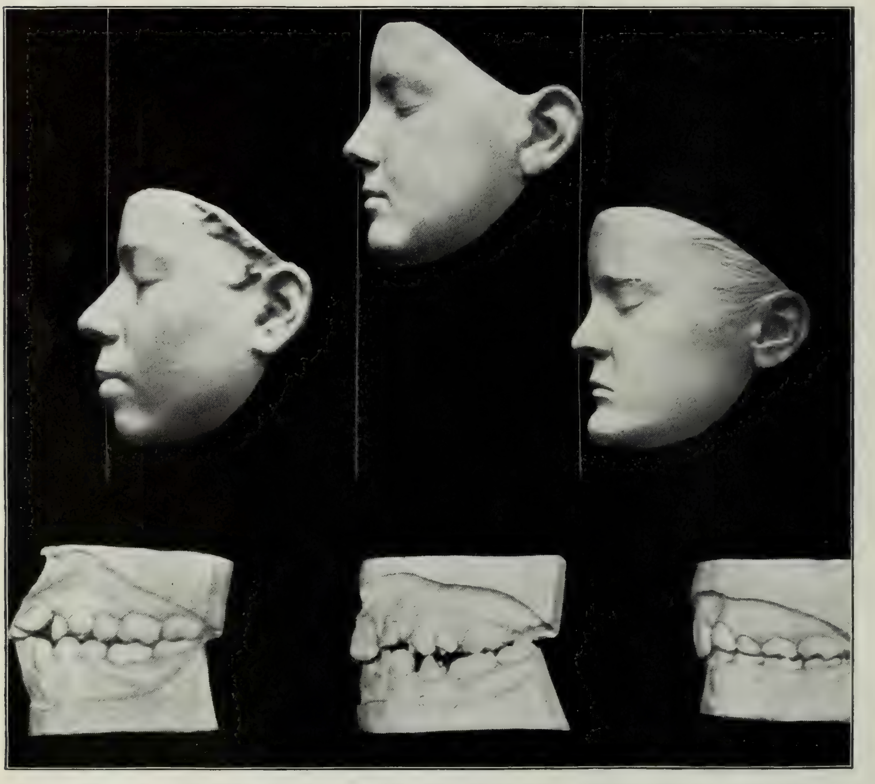
Study well the dento-facial outlines of the middle face. Could anything be more perfect, and, were it possible for me to show the young lady as she appeared when this cast was taken, you would say no one could be more beautiful. And yet look at the malocclusion of the dentures, from which many teeth were missing because of extinct germs, and tell me, if you can, that "A full complement of teeth in normal occlusion is absolutely necessary for the most perfect facial outlines!"

FIG. 7.



While speaking of this phase of the subject I wish you to glance again at the case which Dr. Cryer reported (Fig. 9) and which at the beginning, as shown in the face on the left, had all the characteristics of an excessive bimaxillary protrusion; yet I have no doubt—without, however, having consulted Dr. Cryer—that the buccal teeth were in normal occlusion. The dentures and alveolar processes were removed surgically, followed by the insertion of artificial dentures, which produced a complete restoration to normal facial outlines characterized by the highest type of intellectuality. The face on the left presents the expression of a degenerate, despite the normal occlusion of the teeth, while the face on the right with its mutilated dental arches gives promise of a far more successful and happy life. In the face of such evidence, who can say that it is wrong in other cases to remove teeth productive of facial deformities which cannot otherwise be corrected and whose absence from the corrected arches is hardly discernible?

Fig. 8.



I have selected the first three cases from the last group of ten bimaxillary protrusions, in order that we may more accurately observe the facial and dental conditions before and after treatment. In Figs. 10, 11, and 12 the upper, middle, and lower facial and dental casts illustrate respectively the three cases before and after treatment—showing the right and left view of the teeth in occlusion.

I wish to call attention to the middle case of these groups. When the patient presented, at fourteen years of age, I hoped to correct the condition without extraction, as the bimaxillary protrusion at that time was not marked, because of the contracted arches. The teeth were therefore placed in normal occlusion, as shown in the intermediate dental cast. While the protrusion of the dento-facial outlines was considerably increased by this movement, I still hoped that the developing growth would harmonize the relations. But after waiting about one year, and still finding that unhappy protruded expression about the mouth in an otherwise quite perfect face, and wishing to have time to properly correct it before the patient started a course in an eastern seminary, I consulted with her parents and expressed my dissatisfaction with the result. I found that they also were very much dissatisfied, and delighted at my proposition to extract the four first bicuspids. It was at this time that I took the first facial impression from which the cast was made as shown on the left. The pictures of the finished casts, both facial and dental, do not do full justice to the present beauty of the face or the occlusion of the teeth of the patient. Fig. 13 is reproduced from a recent photograph taken about one year after the close of the operation.

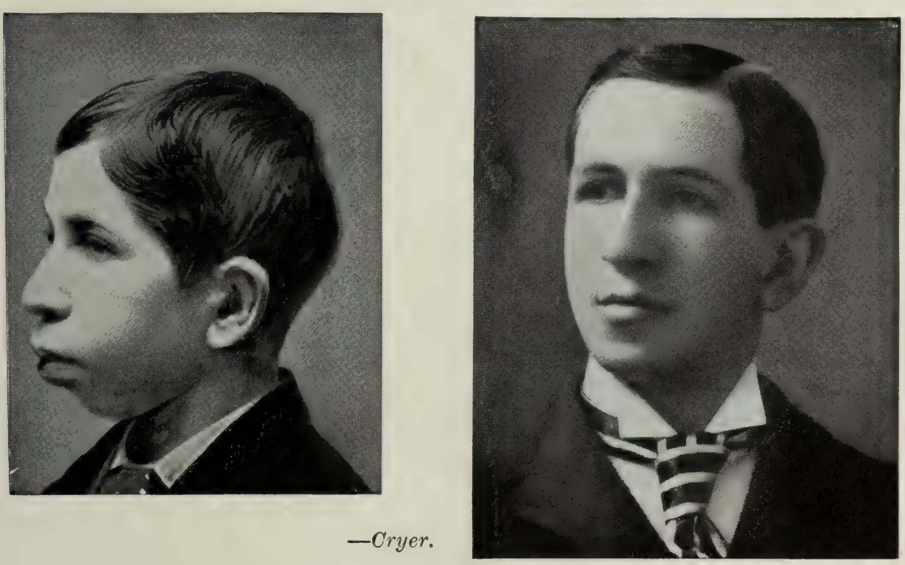
In an extensive practice one will be called upon to treat every gradation of bimaxillary protrusion, from the most pronounced to those less severe types, in regard to which a doubt must arise in the minds of those who fully appreciate the conditions, as to what nature will do to harmonize the relations in growth development.

I will illustrate this by the presentation of one of three cases (see Fig. 14) which I am now holding in abeyance for a later period of development, when I shall decide definitely in each case whether I am to extract four bicuspids or not.

When this young lady presented, at about fifteen years of age, the facial outlines were not protruded, as may be seen by the first facial cast, because of the contraction of the arches due to the decided malpositions of the teeth. But as the arches expanded under the force of appliances and the teeth came into alignment, the face gradually assumed the characteristics of bimaxillary protrusion, as shown in the final cast, which was made at sixteen years of age. I was unable to fully establish the normal occlusion before the patient was obliged to leave for her summer vacation.

Her mother expressed great disappointment in regard to the prominence of her daughter's teeth, saying that she had brought her to me because another orthodontist had regulated teeth for her son,

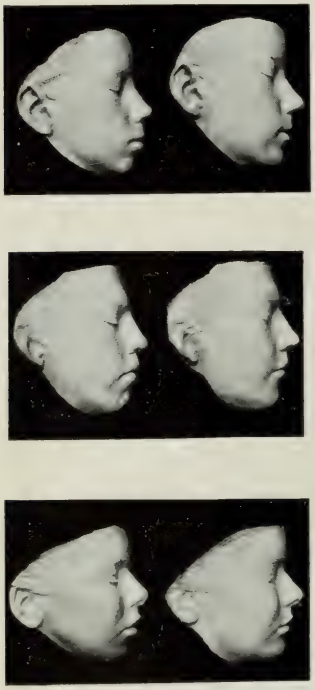
FIG. 9.



—Cryer.

and had left them in an even more protruded state. She also stated that her family was characterized by prominent mouths and teeth, her father, her sisters, and a brother exhibiting these characteristics, which in her own case were less pronounced. I had noticed that her teeth were prominent and quite in evidence when she spoke or laughed. She said she hoped her daughter had escaped, as her mouth was not at all protruded until she commenced having her teeth regulated.

FIG. 10.



I then explained to her that inasmuch as her daughter was quite small and apparently under-developed for her age, I hoped that continued growth of the facial bones would ultimately harmonize the relations. But I added that if after waiting at least one year I found no promising change for the better, I would then extract four bicuspids and retrude her daughter's front teeth. Instead of objecting to the extracting, as I feared she might, she was greatly pleased, but very much surprised, because she had been told that "no competent orthodontist extracted teeth nowadays." I shall not be greatly disappointed to find that the prominence of the girl's mouth grows worse rather than better, for I have watched a number of cases assuming distinct parental types in the later years of adolescence, which were hardly perceptible at fourteen years of age.

CLASS II.

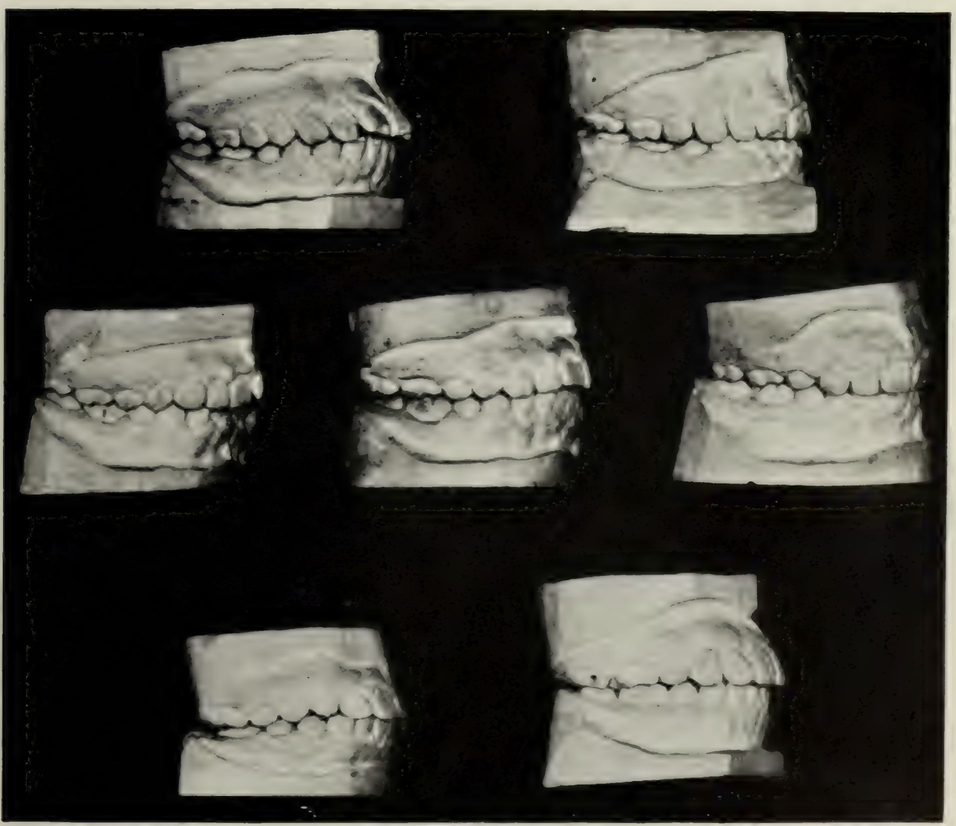
Dr. Angle's class II is particularly interesting because it contains types which, like class I, differ from each other almost diametrically in their characteristics and demands for treatment. In about one-half of the cases of this class extraction is demanded for correction, while in the other half it would be the height of malpractice. The principal marked cases of the first division which demand extraction are characterized dento-facially—First, by a decided protrusion of the upper lip, with the lower lip and chin in normal pose, showing that the lower denture and mandible are normal, the malrelation being due solely to a protrusion of the upper denture, which may involve the entire alveolar process and possibly the maxilla (see Figs. 15 and 16). Second, by the upper protrusion being accompanied by a decided lack of prominence of the chin and lower lip, showing that both the mandible and lower denture are in a retruded malposition. (See Fig. 17.) Both of these types and many other disto-mesial malocclusions can often be traced directly to heredity, and there is also every reason to believe that the forces of atavism are sufficiently strong to carry the results of mixed types from many generations back.

It must be seen that in these cases in which the lower teeth and mandible—indicated by the relation of the lower lip and chin—are in harmony with each other, and especially in cases where both are retruded dento-facially, any effort to produce a normal occlusion without extraction must necessarily result in a protrusion of the lower lip in relation to the chin, with the upper—in decided protrusions—only partially corrected.

Moreover, I earnestly believe that no matter at what age correction is started in these inherited cases, the ultimate results will be the same. Those who are performing extensive *mesial* movements of the lower teeth for the purpose of placing the first permanent molars in normal occlusion, in following the teaching that "The modern idea of orthodontia is to restore the normal balance of forces during development and allow nature to produce a normally balanced and symmetrical face," will find, according to my judgment, that they have done a far greater wrong to some of their patients than they will like to be responsible for in the future.

If correction is attempted without extraction in the first type (Fig. 15), it should consist in a retrusion of the entire upper denture the full width of a bicuspid, in order to correct the protruded facial outlines. It is practically impossible to accomplish and retain such an extensive backward movement of an entire denture at any age; moreover, this procedure would be decidedly inadvisable even in very young patients, because of the probable encroachment upon the unerupted molars. One may succeed, under very favorable conditions, in moving the upper denture back about half the width of a cusp with the intermaxillary force, which of course means that the lower denture will be moved forward to the same amount. This I believe was Dr.

Fig. 11.

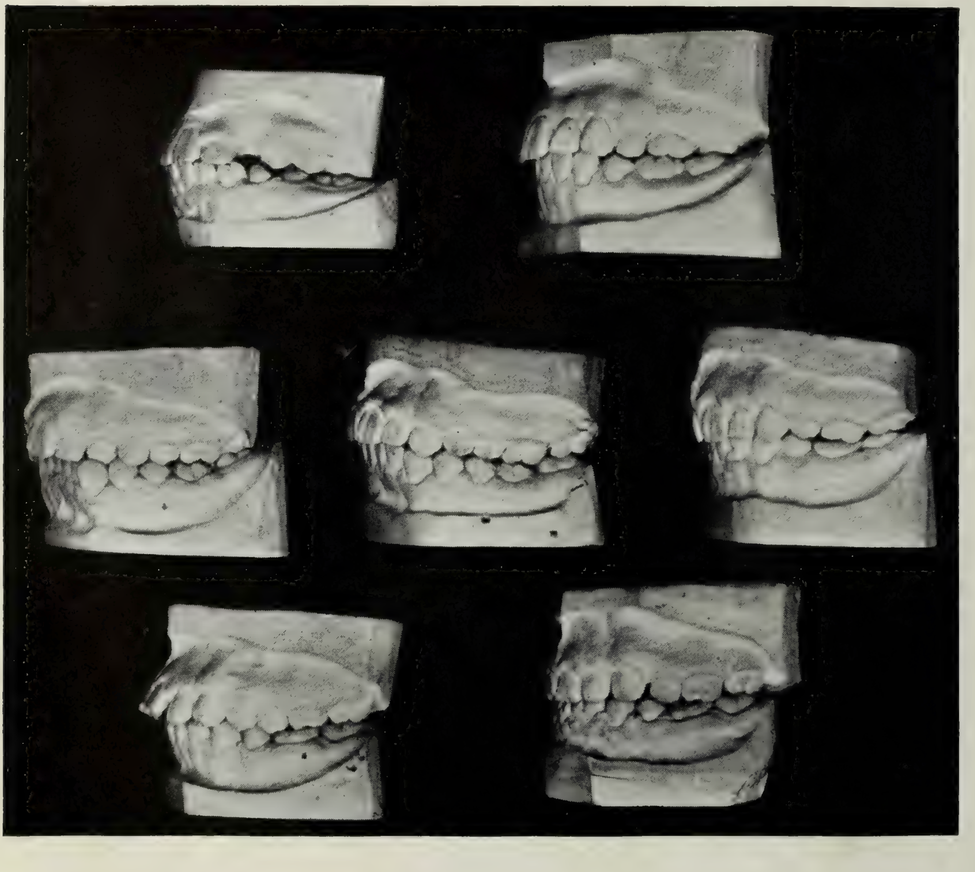


Angle's first proposition for all of his class II cases. In most of the cases, however, where this is attempted with the usual appliances or without special provision, the lower dentures will be moved forward about twice as far as the upper is moved backward. In either case the upper protrusion will be only partially corrected, while the lower jaw will be abnormally protruded. In other words, the patient will be left with a bimaxillary protrusion, a receding-chin effect, strained management of the lips with the unpleasant exposure of prominent teeth, and, worst of all, a crowded condition and position of the upper teeth in relation to erupting ones that can rarely be retained at any age.

The correctness of the statement that the mandible will grow to a harmonizing size will depend entirely upon whether it has been stunted in normal growth development, which is quite improbable, unless we assume the absurdity that the same cause at the same time produced the over-development of the upper jaw. Malrelations of this character point directly to heredity. The claim and recently repeated inference that the mandible can be made to grow by artificial stimuli *beyond* its inherent size is not in accord with any law of organic development.

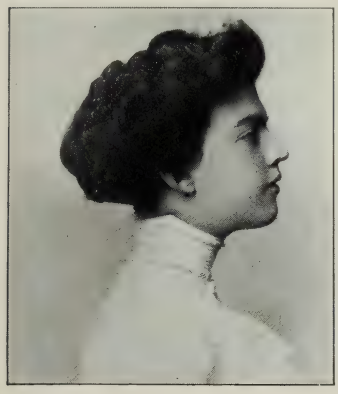
In both the types shown in Figs. 15 and 17, the upper first bicuspids are extracted in my practice. The only teeth which require extensive movement thereafter are the six upper front teeth, which

Fig. 12.



are forced back to close the spaces and correct the facial outlines. During this process the buccal teeth are adjusted to an interdigitating occlusion which answers all the demands of mastication, and, what is more, the positions of the teeth are easily retained.

FIG. 13.



In these cases, as in nearly all the illustrations shown, the impressions for the final casts of the dentures were taken immediately upon removal of the correcting appliances. They consequently do not show that perfect interdigitation of the buccal cusps which it will be the tendency of the grinding forces of occlusion to effect. I often wish that operators who are wont to call these results "mutilated cases" could see some of the finished products commonly obtained after extraction, often with little or no movement of the buccal teeth, and largely through a simple retruding movement of the upper front teeth alone.

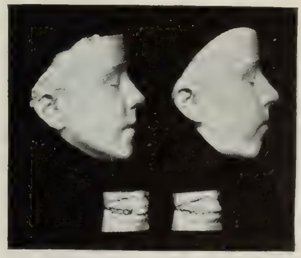
Before leaving Fig. 15, I wish to call attention to the facial outlines of the middle face after the crowns of the anterior teeth had been retruded, and the improvement that was brought about by a retruding movement of the roots and alveolar process, which is shown in the final appearance of the face.

The next picture (Fig. 18) shows a typical case of decided upper protrusion, which I at first hoped to correct without extraction, because of the spaces originally existing between the anterior teeth and a slight retrusion of the lower denture. But I soon found it necessary to extract the upper first bicuspids, as is my common practice in these cases, in order to correct the excessive protrusion of the upper lip. Fig. 19 shows the right and left views of the teeth at the beginning and close of the operations.

The assurance of perfect retention following this method of operating is far greater than that obtained in other cases of this class which are corrected without extraction. In nearly all of these cases the occlusion grows better rather than worse, with such a perfect interdigitation of the masticating cusps that it requires the closest scrutiny to notice that any teeth are missing. Fig. 20 is made from a photograph of the patient taken about one year after correction. Fig. 21 is reproduced from a photograph taken two years later. Note the similarity in the facial outlines of this picture and the final plaster cast of this patient made three years before.

To illustrate this further, let me call attention to the facial outlines of Fig. 22, which at the beginning of treatment was one of that somewhat rare type of protrusion of the upper portion of the upper lip which usually obliterates the naso-labial depressions and produces a most unhappy facial expression. It is corrected as shown by bodily retruding the roots and surrounding alveolar process of the anterior teeth, which can only be successfully accomplished by extracting the upper first bicuspids.

FIG. 14.



The photograph of the face was taken

five years after the close of the operation. It will be seen that the facial outlines of the profile are a remarkable duplicate of those of the final plaster cast, taking into account the years that elapsed between—which is a fair evidence of retention. For the benefit of those who hesitate in the employment of facial

FIG. 15.

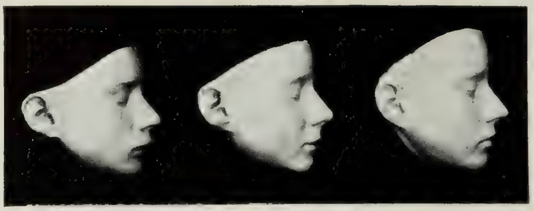


FIG. 16.

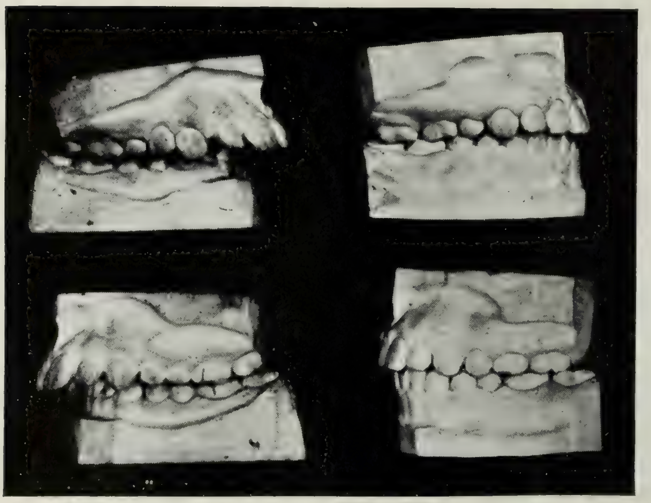


FIG. 17.

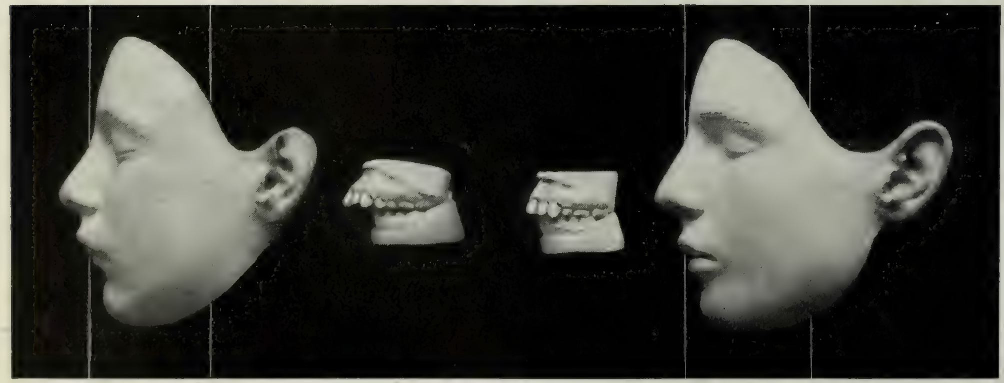


Fig. 18.

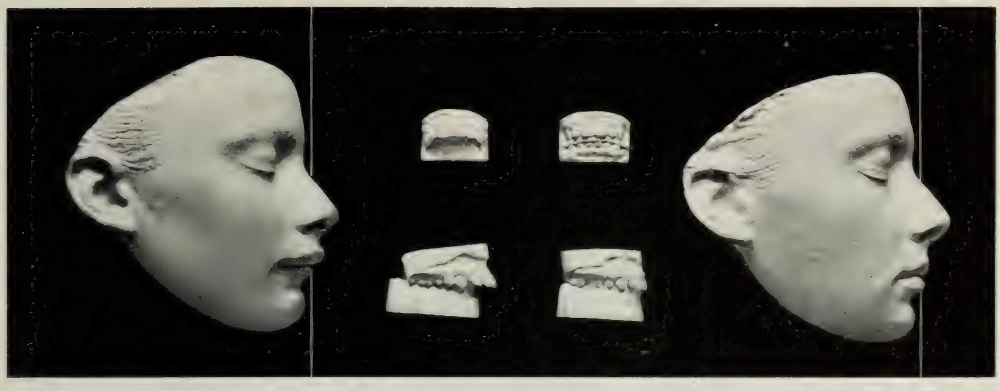


Fig. 19.

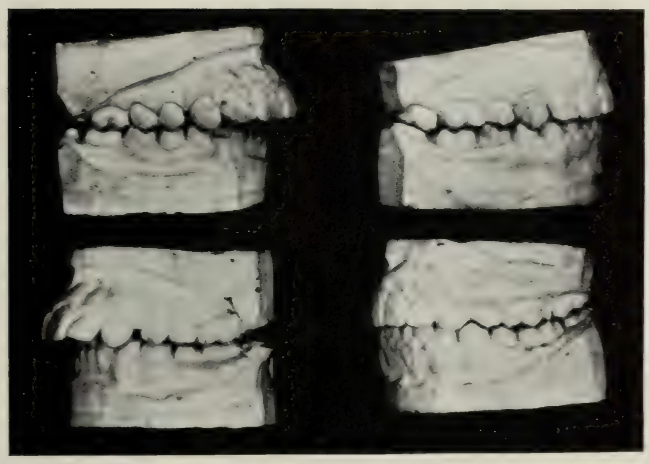


Fig. 20.

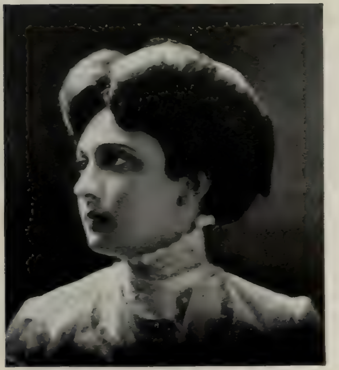
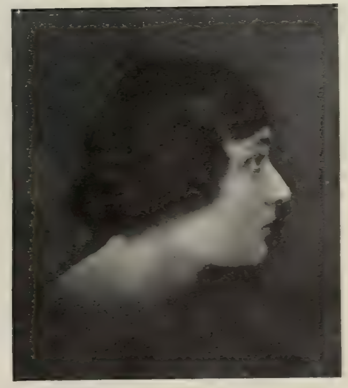
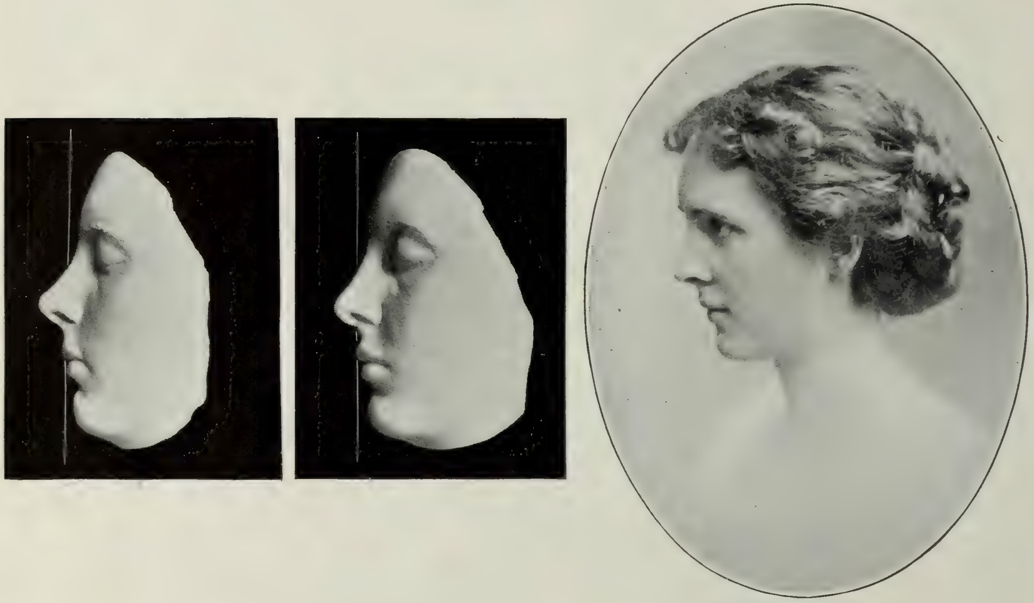


Fig. 21.



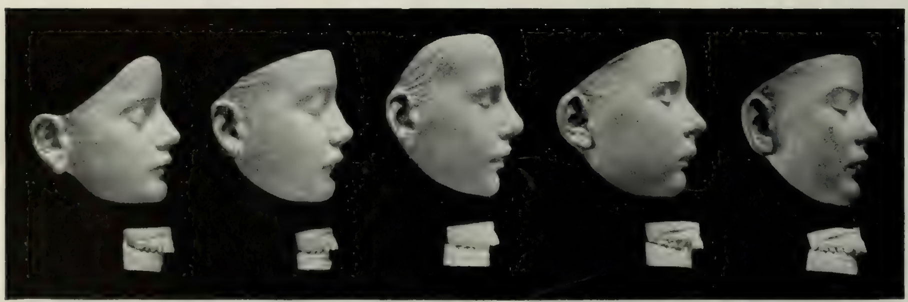
casts, let me say that plaster impressions, if taken skilfully, copy accurately the outlines and contours of the face, the advantage being that they can be viewed for study from every angle.

Fig. 22.



The peculiar type of facial outlines which characterizes the other half of Dr. Angle's class II, in which no teeth should ever be extracted for correction, is shown in Fig. 23. These are marked types of retruded lower dentures in relation to normally posed mandibles, with the upper teeth normal or but slightly protruded, though exhibiting the same characteristics of malocclusion as the cases of decided upper protrusion. I have noticed that a large proportion of the illustrations which are employed to prove the principle of non-extraction in Dr. Angle's class II are chosen from exactly this type of cases.

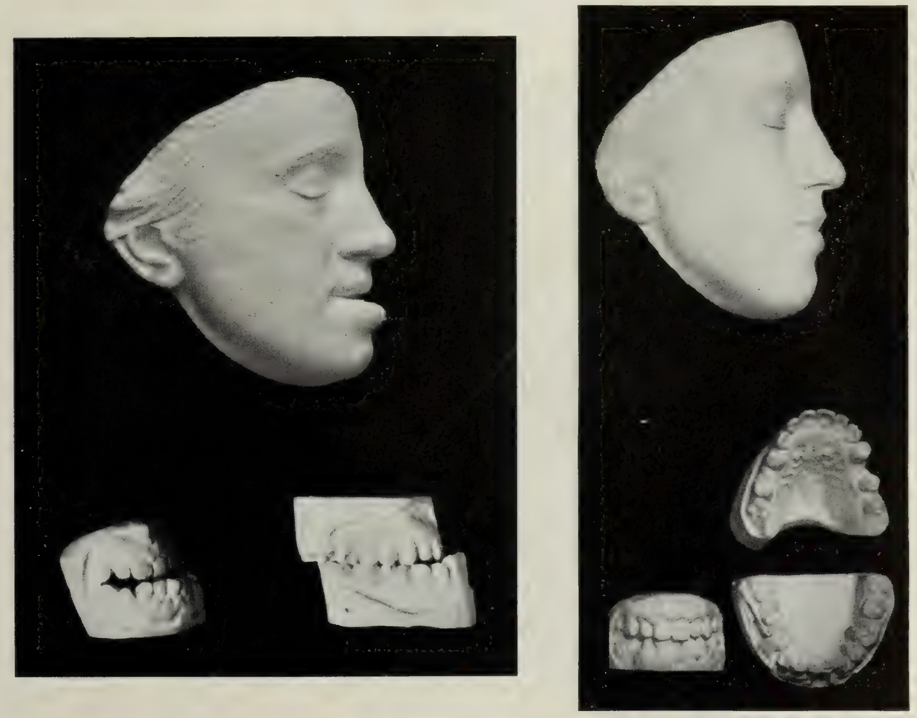
Fig. 23.



In all of these faces will be seen the

decided retrusion of the labio-mental area of the lower lip in relation to the chin, with the same distal malocclusion, as it is called, of the lower teeth in relation to the upper, and with very slight protrusion of the upper lip, showing that the lower dentures are placed much too far back in relation to the mandible in comparison to typical relations.

Fig. 24.



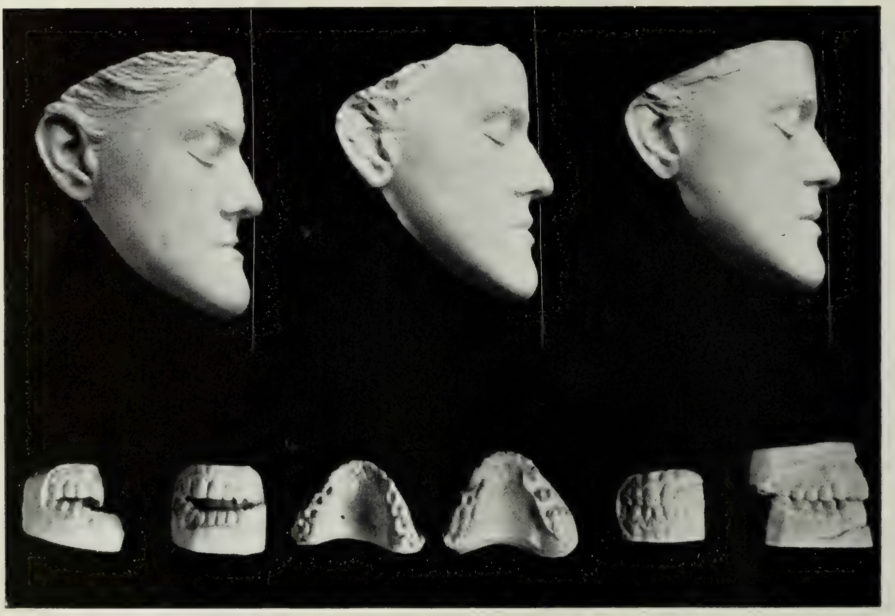
I should like to ask those who claim that all malocclusions of the teeth arise from childhood diseases, What kind of disease could possibly cause this malocclusion? It must be one that is sufficient in itself to place and hold the entire lower denture back of its normal position until it starts the distal jumping of the permanent cusps, for up to that moment occlusion can have no influence in forcing them back. Furthermore, is it even a reasonable possibility that such an occlusion, after it commences to act, can carry the entire lower denture back to nearly the full width of a bicuspid in relation to the mandible and upper denture without forcing the upper denture forward materially?

Every operator who has ever tried knows how well-nigh impossible it is to force lower dentures back to any great extent with artificial force, and how comparatively easy it is to move either of the dentures forward.

Let us suppose that adenoids have interrupted the forward growth of the mandible with its teeth (if one can conceive of such a condition without a like effect upon the upper jaw), and that after the first permanent molars have become fixed in their mal-interdigitating occlusion the adenoids are removed or disappear, as they usually do at about twelve years of age—now, when the mandible continues its developing growth to the normal size, as we find it in this type of cases, would not the same mechanical forces of occlusion upon both dentures apply as in the former condition?

It certainly would be malpractice to extract teeth in this class of cases, because quite a decided forward movement of the entire lower denture and a slight retruding movement of the upper one in bringing the dentures to a normal occlusion can easily and safely be accomplished with the intermaxillary force; and mainly because such a movement is demanded to compensate for the abnormal retrusion of the labio-mental depression and to correct the slight upper protrusion.

Fig. 25.



Class III.

The one type in Dr. Angle's class III in which extraction is demanded rarely presents itself in my practice. It consists mainly in a decided protrusion of the lower denture in relation to the mandible, the chin being in normal facial harmony. (See Fig. 24.)

My only object in presenting it at this time is to confirm by it, and by the picture that will follow, in connection with others that I have shown, what I shall have to say in an ethnological treatment of this subject. in regard to there being every possible antero-posterior malrelation in the positions of dentures as regards the jaws in which they are placed, and also in the positions of the jaws to each other and to the balance of the bones which form the physiognomy.

In this case the entire lower denture is decidedly protruded in its relation to a normally posed mandible, and in Fig. 25 the mandible is decidedly protruded in its relation to a normally posed denture. The characteristics of this last case are directly traceable to a family type, the father and one of the sons of the family having the same prognathous mandible. While I am unable to explain the cause in the former case, I believe that every anthropologist will consider it to be of a distinctly atavistic type, arising somewhere from the mixture of dissimilar types or the law of natural variation, which I have every reason to believe should be accepted as one of the causes of malocclusion of the teeth.

Thus far I have confined myself to the clinical and common-sense side of the question. The balance of the paper will pertain particularly to the scientific aspects of the subject.

(To be continued.)

SECONDARY CALCIFICATIONS OF THE TOOTH-PULP.

By **RUSSELL W. BUNTING, D.D.Sc., Ann Arbor, Mich.**

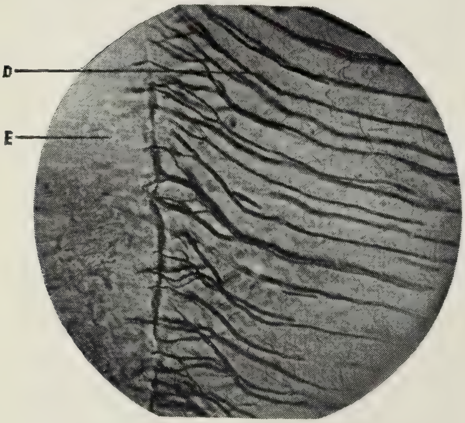
(Read before Section III of the National Dental Association, at its annual meeting, Cleveland, Ohio, July 25, 1911.)

THE question of the value of the dental pulp to teeth which are fully formed is one about which there has been a great diversity of opinion. From clinical observations many have maintained that the pulp was an unnecessary adjunct to a completely developed tooth, while others have been equally insistent that the pulp should be saved in every case in which it was possible. Various investigators have studied the subject in an endeavor to obtain scientific data relative thereto, and the results have been varied. We have the views of Boedecker, Caush, and others, stating that the dentin and enamel of the formed teeth are in vital relation with the tooth-pulp; that the fully developed enamel and dentin are constantly supplied with nourishment from the healthy pulp, and that in case of general bodily illness this nourishment may be depleted and the tooth structures weakened by extraction of calcium salts from their substance. Much of this is controverted by others, among whom are Miller, Black, Williams, and Hopewell-Smith, who maintain that the enamel, when once formed, cannot be built up or broken down by any internal force. Upon the dentin considerable light has been shed by the researches made by Dr. Black on the physical properties of the teeth. By this work it was demonstrated that the strength of a tooth does not depend upon its density or the percentage of calcium salts which it contains, but rather upon the condition of the organic matrix in the dentin. Black showed that dead teeth are considerably weaker than vital teeth containing corresponding amounts of calcium salts.

From these statistics and from clinical observations we must admit that some change occurs in the tooth after the death of the pulp which renders the enamel and dentin more friable and less capable of enduring stress. As to the exact nature of this change we are still in doubt, and at present can only state probabilities.

The dentin is a tissue composed of a calcific matrix deposited upon a fine network of connective tissue. This dentin matrix is permeated by canals containing prolongations of the odontoblasts, cells of the pulp, these prolongations extending to the enamel. In certain teeth these odontoblastic fibrillæ seem to permeate the enamel a short distance by little spindle-like processes known as “enamel spindles.” When the pulp dies, there is obviously a degeneration of the connective tissue network and the dentinal fibrillæ of the odontoblasts; simultaneously the tooth becomes weaker. This loss of strength cannot be due to any change in the calcium salts in the tooth. It must, then, be attributed to the loss of vitality of the organic substances of the dentin. We might compare the relation of the organic and inorganic materials of dentin to that of reinforced concrete, the organic fibrils having the property of binding together the mass of calcium salts and increasing its strength and elasticity. When the binding substance is weakened, the whole mass loses strength.

Fig. 1.



In regard to the enamel, a similar loss of resistance to stress is noted after death of the pulp, and we know from clinical experience that the enamel of dead teeth is more easily detached from the dentin than is that of vital teeth. As there is practically no organic substance in the enamel, we cannot look to that constituent for an explanation of this change. Sudduth offers a theoretical explanation of the fact that the dento-enamel attachment becomes weaker, saying that the area lying between the two structures becomes dried out subsequent to the death of the pulp, and the attachment of these structures is impaired. It may also be possible that the attachment depends to some measure upon the enamel spindles, which lose their vitality and function with the death of the pulp.

From the foregoing we may conclude that a healthy pulp is a valuable asset to a tooth which is to endure direct stress such as that of mastication or of support to a filling. In teeth, however, which are ground down and entirely covered by crowns, little crushing stress is brought to bear upon the dentin, and the danger of fracture is reduced to a minimum; in such cases the pulp is not essential to the welfare of the tooth, and may therefore be removed.

Fig. 2.

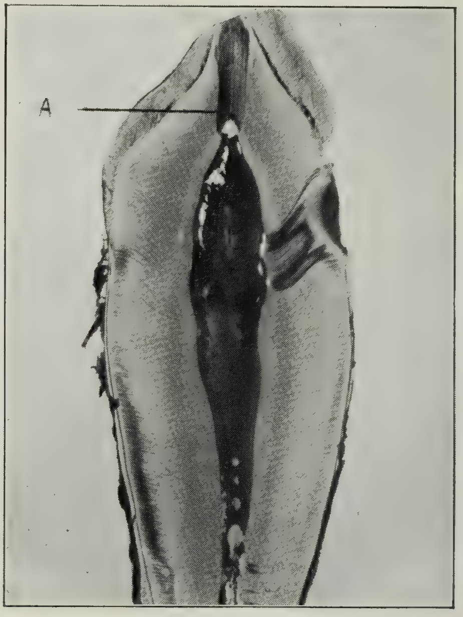
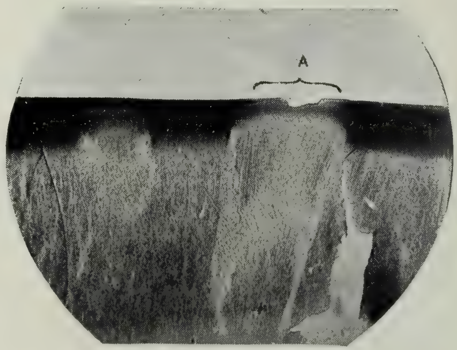
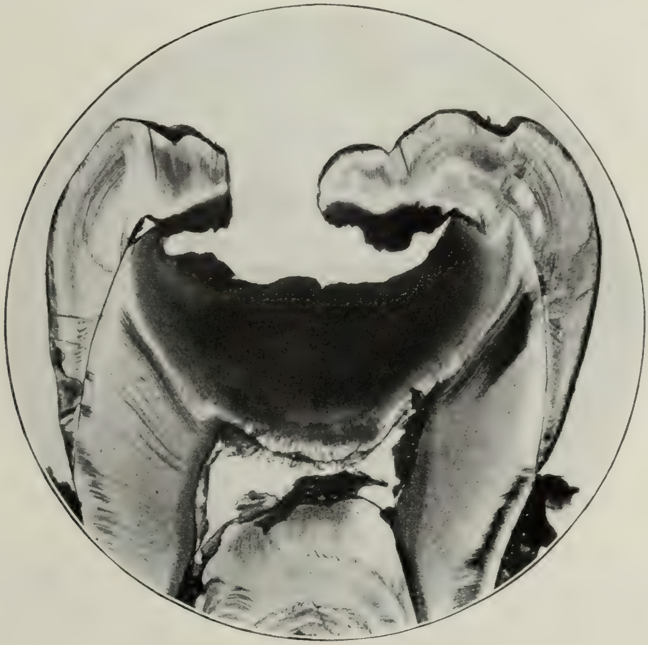


Fig. 3.



There being, then, a relation between the pulp and the strength and vitality of the whole tooth, the efficiency of this relation will depend largely upon the health and welfare of the vital organ. The condition of the pulp is a variable factor and is affected by impulses of various sources. To enumerate, the pulp is irritated by abrasions, erosion, caries, fillings, fractures, electrical impulses, malocclusion, pericemental diseases, reflex stimuli, and many systemic conditions. By stimuli arising from any of these conditions, hyperemia and inflammatory processes may be set up in the pulp of varying degrees of severity, depending upon the nature and duration of the irritation. Inflammatory conditions of the dental pulp are somewhat similar to inflammatory processes in any embryonic connective tissue, being modified, however, by the fact that the blood-vessels have little or no muscle in their walls, by the absence of lymphatics, and by the inelasticity of the dentin walls which surround it. As in certain other tissues of the body, there is a tendency on the part of the pulp when in the state of chronic irritation to extract calcific material from the blood in relatively large quantities. These inorganic salts are deposited in the form of secondary calcific concretions in the canals of the dentin, upon the pulpal wall of the dentin, or in the substance of the pulp itself. It is the purpose of this paper, then, to consider the various forms of secondary calcifications of the pulp, the causes for their formation, and their clinical significance.

Fig. 4.



—*Miller.*

TUBULAR CALCIFICATION.

The simplest form of secondary calcification in the tooth is that of the deposition of organic salts in the tubuli of the dentin. The calcific material is laid down in the sheath which lines the walls of the tubule, being introduced from the pulp through the medium of the odontoblastic fiber lying in the tubule. When the process is complete, the sheath, fibril, and whole tubule is fully calcified, and the lumen is obliterated. Tubular calcification, otherwise known as "transparent zone," is found in the dentin beneath areas of abrasion, erosion, and caries, when the pulp is in a healthy condition. The slower and milder forms of stimuli are more favorable to its formation than those which are rapid and intensely irritating. It is noted that the largest amounts of tubular calcification result from abrasion and slow caries, while rapid caries and erosion produce much less. As a rule, only those tubuli which are affected by the injury undergo this change. We may find, however, that in individuals who are advanced in years or who are suffering from gout or arthritism, in which conditions the blood is surcharged with calcific material, the teeth will undergo a general calcification of all the dentin, either in the presence or absence of injuries such as abrasion or caries.

Fig. 5.

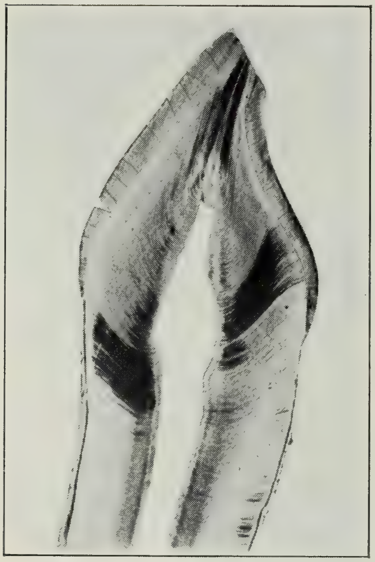
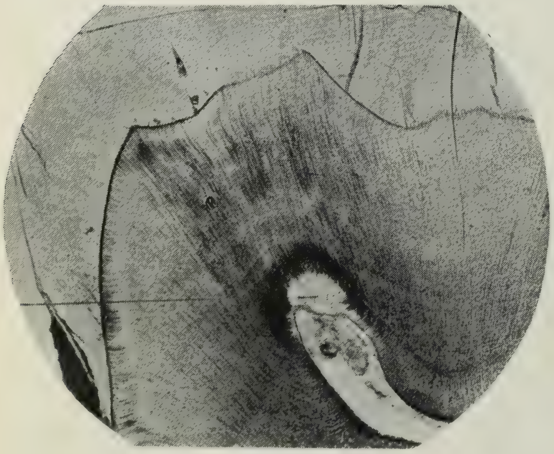
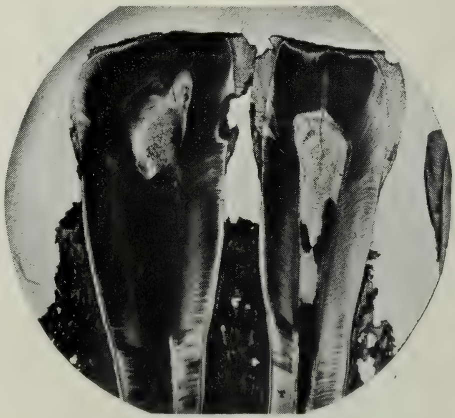


Fig. 6.



Much discussion has been raised as to the therapeutic value of this secondary calcification of the dentin. Perhaps the best work which has been done upon this subject is that of Dr. W. D. Miller. He takes the position that the calcification is an effort on the part of the pulp to inhibit the progress of the invading force. Whether it be the wear of abrasion or the decalcification of caries or erosion, in any case the attacking force meets with a tissue which is not open and porous like normal dentin, but is a solid calcific body, which obviously offers greater resistance to the invading process in its advance toward the pulp. This may be illustrated by a series of microphotographs selected from the collection

Fig. 7.



of the late Dr. Miller, many of which were made by him personally.

In Fig. 1 we have a picture of normal dentin at the dento-enamel junction, showing how greatly the tissue is permeated by the canals and their fibers in this area. This branching is, however, confined to this region, the canals of the body of the dentin being unbranched, and amounting in bulk to about one-twentieth of the total substance. The entrance of some of the dentinal fibrillæ for a short distance into the enamel is also evident, as before mentioned.

FIG. 8.

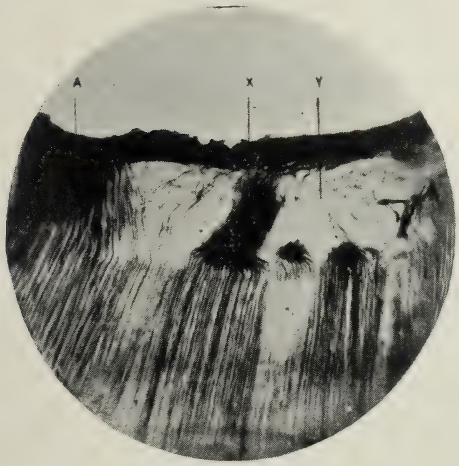
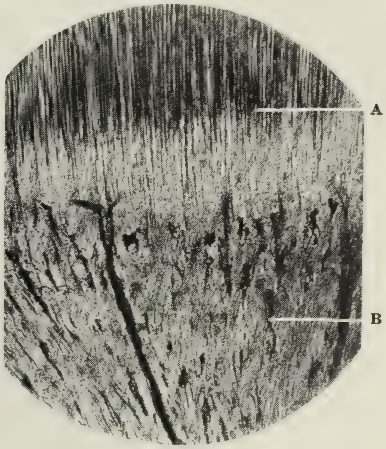


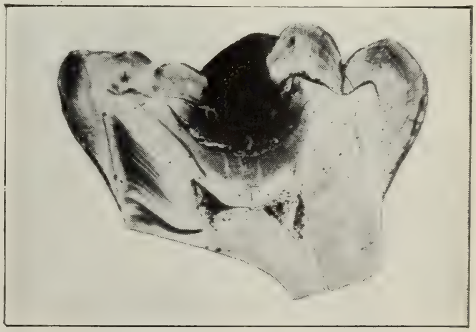
Fig. 2 presents a picture of a tooth affected with both abrasion and erosion. Beneath each area a change in the dentin is notable, extending to the pulpal wall. This change is apparent in the section because of its difference in refraction to light, produced by the increased density of these areas due to secondary calcifications of the dentinal tubuli. On comparison of the two areas, it will be seen that the zone of calcification beneath the abrasion is much denser than that below the erosion. The pulp has also thrown up a small amount of secondary dentin at a point opposite the former, while none is visible beneath the latter. This bears out the statement that these secondary changes are more readily and more completely formed under areas of abrasion than under those of erosion, other things being equal. It is likely that the irritation of the acids of erosion are so severe that degenerations are produced in the pulp, rather than constructive changes.

FIG. 9.



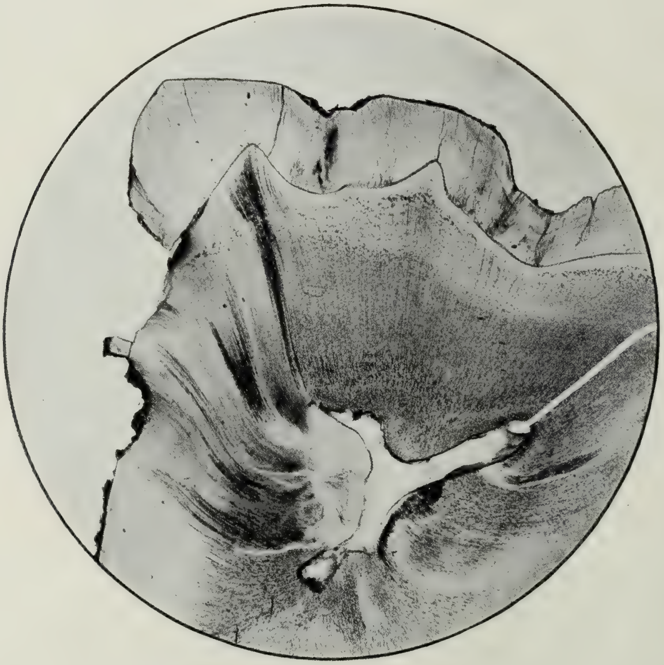
The resistance which the transparent zone offers against acids is seen in Fig. 3, in which there is shown a section of dentin a portion of which has undergone secondary calcification. As an experiment the section was placed in acid until decalcification took place. Note that this calcified area (see A) has been decalcified to a lesser extent than the surrounding dentin, showing a marked retarding action on the part of the solidified dentin.

FIG. 10.



In many cases of caries, then, when its progress has been slow, the pulp has been healthy, and the dentinal calcifications have been complete, these secondary changes have a marked effect upon the advance of the carious process, inhibiting its progress toward the pulp. This may be illustrated by Fig. 4, in which we see a cavity of caries in the occlusal surface of a molar, the cavity having extended some distance laterally beneath the enamel, the caries process, however, having advanced a relatively short distance toward the pulp. It seems very possible that this impeding of the progress of caries pulpward is due to the heavy secondary calcifications formed in the dentinal tubuli which have been attacked. The transparent zone is therefore of great benefit to the tooth, in that it conserves the dentin from loss and delays or prevents the exposure of the pulp. It also has another influence of a beneficial character in that the dentin which is thus calcified offers an increased resistance to the transmission of thermal stimuli from the surface of the tooth to the pulp. Considerable irritation is set up in the pulp by a large number of filling materials which we commonly use in the repair of carious teeth. All the metals conduct heat more or less readily, and a filling with a high conductivity, if placed in a cavity which approaches the pulp, will constantly irritate the latter by undue stimulation. This irritation will be less severe if the dentin overlying the pulp is dense, having undergone sclerotic changes. This principle will also apply to all filling materials which by their nature are irritating to the pulp. Such fillings as the oxyphosphates of copper and zinc, which contain an excess of acid, are intensely irritating, but if calcification has taken place, the pulp is protected from excessive stimulation. This protective action no doubt saves a large number of pulps from death beneath our ordinary filling materials.

Fig. 11.



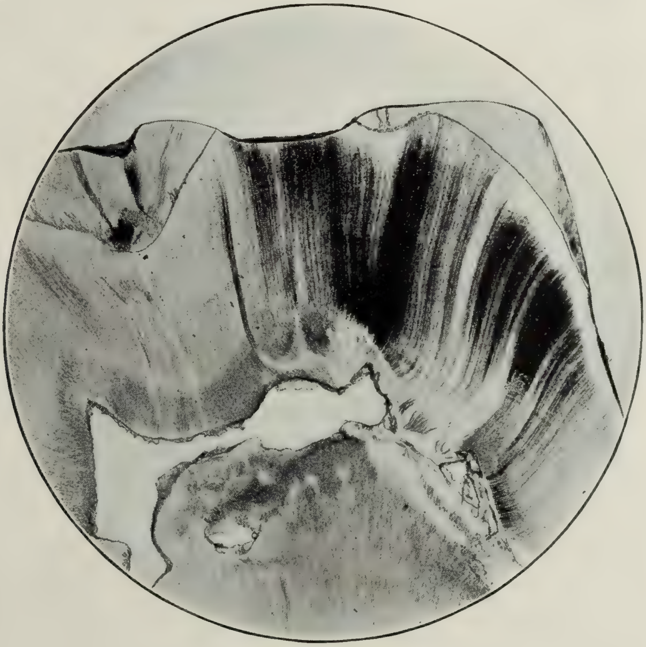
—*Miller.*

In this connection, by reference to Fig. 4, it will be seen that although the caries has been extensive, the calcification of the dentinal tubuli has been confined to those which are directly affected by the caries. Portions of the dentin which lie on the lateral surfaces of the tooth have dentinal tubuli which are still patent, containing vital prolongations of the pulp. In case this tooth should be ground down for the purpose of setting a gold crown, these tubuli and fibrillæ would be cut. When the crown is set, soft cement with an excess of acid is flowed about this ground surface, producing an irritation of the cut dentinal fibrillæ. This irritating action will take place on the whole circumference of the tooth, completely girdling the pulp at a part at which it is not prepared to resist. This excessive stimulation to the pulp in a large number of such cases results in the degeneration and death of that organ, so that although occlusal or approximal fillings may be inserted relatively near to the pulp in teeth which have been affected by abrasion or slow caries, the operation of crowning these vital teeth is unsafe and hazardous in a large percentage of cases.

SECONDARY DENTIN.

In conjunction with the secondary changes in the dentin usually a deposition of calcific material in the pulp chamber takes place. These deposits, produced by irritation or stimulation of the pulp, may take on a number of different forms. There are three factors which determine the character of the deposit, namely, the health of the pulp, the intensity of the irritation, and the amount of calcific content of the blood. We find that when the pulp is healthy and the stimulation is mild, new dentin of good quality will be deposited upon the pulpal wall of the dentin, and we speak of this as "secondary dentin." In proportion to the increase of the severity of the irritation or to the decrease in the health of the pulp tissue, there will be a corresponding departure from normal in the structure of the newly formed dentin. The fibrillæ will decrease in number, until they are entirely absent, and forms of calcific deposit may be seen which are simply masses of calcareous matter hav-

Fig. 12.



—*Miller.*

ing no dentinal structure. These forms of deposits have been classified by Hopewell-Smith as "adventitious dentins." They may be homogeneous or hyaline, fibrillar, areolar, or laminar, depending upon the manner of their formation. These concretions are deposited at a point in the dentin corresponding to the proximal ends of the fibrillæ receiving the stimuli, and as a rule are confined to this area, so that an occlusal cavity will stimulate the growth of secondary dentin upon the roof of the pulp chamber, while the lateral walls will not be affected. There are many exceptions to this rule, in that in old age, in long-continued irritations of a mild type, in the presence of a gouty or arthritic diathesis, or in case of reflex stimuli, the whole surface of the pulp chamber may be covered with secondary dentin, thus diminishing the size of the pulp cavity. This process may continue until the pulp is retracted to a considerable extent, and the chamber and root-canals are in some instances completely obliterated. An example of this was seen lately in our clinic in the case of a young woman who presented a tooth for treatment which was dark in color, but exhibited no signs of injury of any kind. The history of this case was that the tooth had turned dark shortly after a malposed tooth had been extracted in its immediate vicinity. When the pulp chamber of the tooth was opened, it was found that the dentin was

Fig. 13.

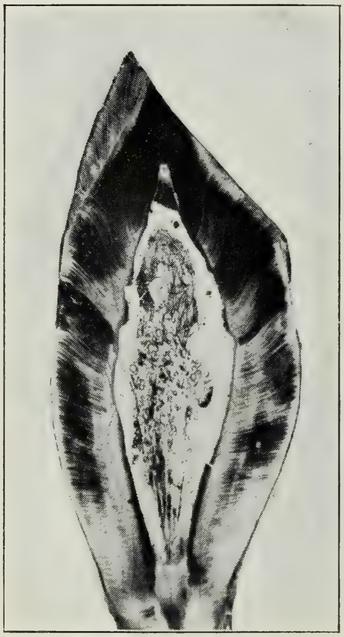


Fig. 14.

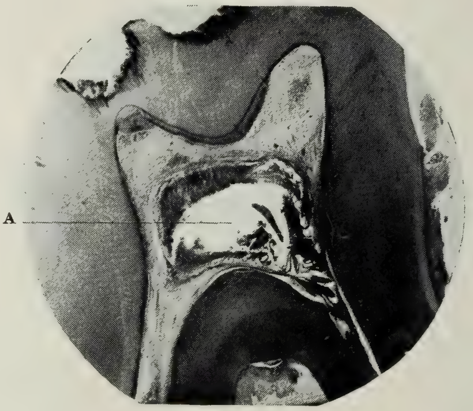
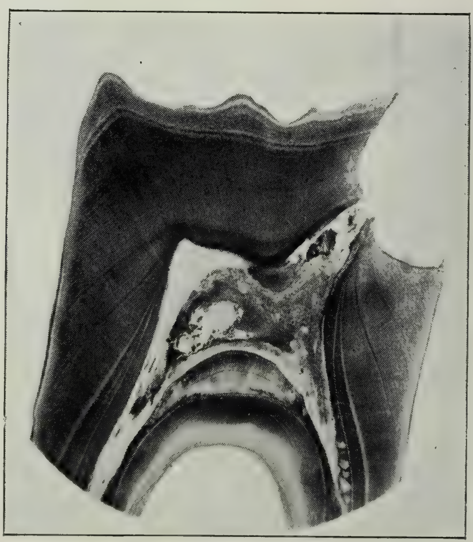


Fig. 15.



discolored, and the root-canal was entirely filled with a dense deposit as far apically as it was possible to drill with safety. Undoubtedly this was a case of reflex stimulation producing extensive secondary deposits in the pulp.

Contrariwise, it is seen that some pulps are unable to form secondary dentin or undergo constructive changes of any kind which might protect them. This occurs in case the stimulus is overstrong, or if the pulp has been injured by previous disease, reflex stimuli, or a general lowering of the tone of the whole body. In all such cases the pulp does not react in a constructive way, but rather undergoes degenerative changes. There is, then, no hard-and-fast rule for the amount of deposition in a given case, so that one cannot judge the size of a pulp chamber with certainty until he has gained entrance into the dentin and approached the vicinity of the pulp.

The question then arises as to how much value these deposits may have in the economy of the tooth. When the secondary dentin is deposited below an area of abrasion, erosion, or caries, the distance which the invading process must travel to reach the pulp is increased, pulp exposure being thus delayed. It is likely that the new dentin has an inhibitive action upon stimuli such as heat, cold, and acids, and certain forms thereof offer considerable resistance to the progress of the organisms of caries. The pulp is often protected against exposure by this new material, and it is frequently possible to successfully place a filling in the repair of a carious process which has extended through the primary dentin and has its boundary lines touching upon secondary dentin, the pulp being vital. So, also, in the placing of fillings which are near enough to the pulp to produce irritation, if conditions are favorable the pulp will build a barrier under the filling, thereby protecting itself from undue stimulation. What has been said as to the beneficial effects of this process can only be applied to those formations of secondary dentin which are of a good order and regularly formed. The adventitious dentins have no regular mode of deposit; they are not impervious to bacteria, and by their irregular deposition often seriously interfere with the pulpal circulation and vital activity. Secondary dentins, when they have been laid down over the whole surface of the pulp and extend into the root-canals, as is sometimes seen in chronic cases, may narrow the lumen of the canal to such an extent that the extirpation of the root filaments may be seriously interfered with. So we may say that a good

FIG. 16.

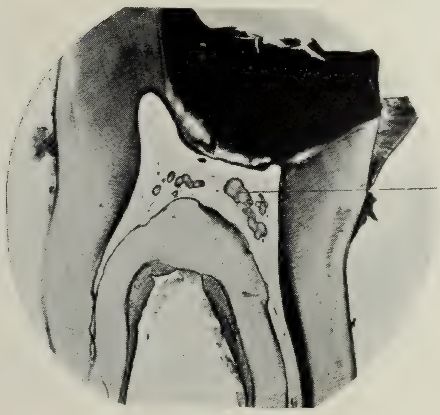
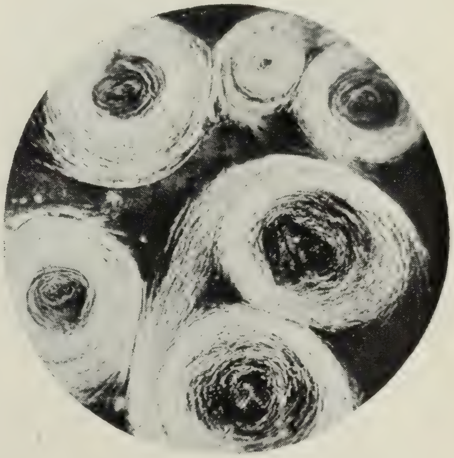


FIG. 17.



grade of secondary dentin is of great benefit to the tooth. It frequently affords strength to a weakened tooth and protects the pulp, thus tending to prolong its life; but the irregular and adventitious formations of dentin are more of a menace than a boon, since they interfere with the circulation of the pulp and tend to produce its degeneration and death.

In Fig. 5 we see a longitudinal section of an incisor which has been worn off by abrasion to a slight degree. Beneath the abrasion there is a transparent zone, and below this a pyramid-shaped plug of secondary dentin. This is a very common picture in cases of small abrasions. We see, however, that a considerable layer of new dentin has been formed over the whole surface of the pulp chamber, diminishing its size. The new dentin is of a very good order, being as well formed as the primary dentin. It is unusual that so small an injury to a tooth should result in so large a deposition, but it is likely that the supply of calcific material in the blood was abundant and conditions were favorable in this case for the formation of new deposits.

A similar case is seen in Fig. 6 in a somewhat higher magnification. The pulp chamber has been considerably diminished in size by a good grade of secondary dentin. One could not say from the slide whether the formation resulted from some injury other than the abrasion shown, from old age, or some reflex stimulation.

In Fig. 7 we see an extensive deposit in the pulp chambers of two lower incisors. The new dentin is of a fibrillar order, but the fibrils are few in number and not regularly placed, so that the adventitious dentin in this case is of a grade inferior to that in the preceding cases. In each case the whole bulbous portion of the pulp chamber has been filled, and the pulp has receded to the root-canals, at a level with the gum line.

FIG. 18.

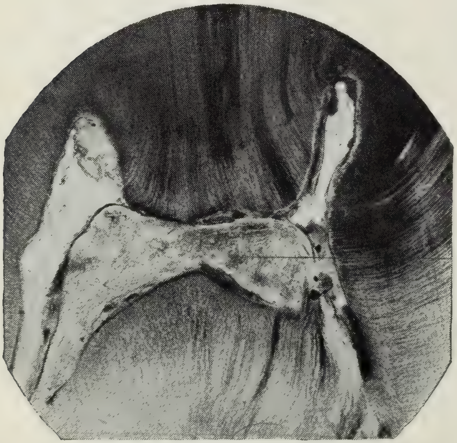
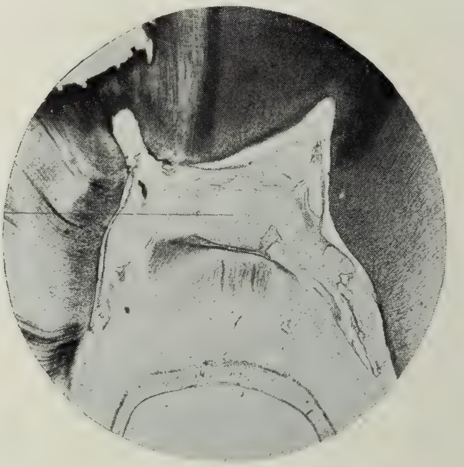


FIG. 19.

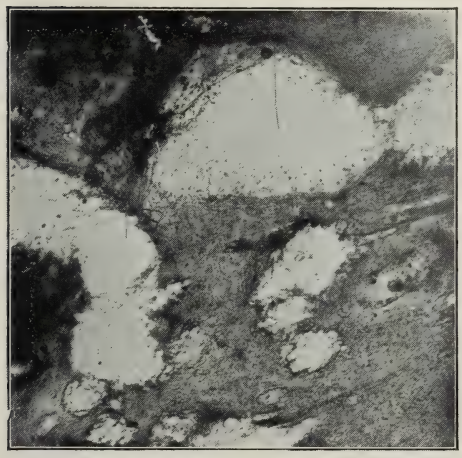


The variance in the structure of the deposits may be seen in Fig. 8, a very fortunate section, which happened to include several varieties of secondary dentin. The primary dentin is shown in the lower portion of the figure, a layer of secondary dentin above. The new dentin will be seen to vary from the primary one in that some portions contain tubuli, as at A, which are like the normal dentin and nearly as regular in formation, while at X and Y the tubuli are irregular, tortuous, fewer in number, or entirely absent.

An illustration of a still poorer grade of dentin formation may be seen in Fig. 9, in which the primary dentin is seen at A, the secondary at B. The new dentin is of the areolar variety, being poorly calcified and containing large spaces which would furnish admirable breeding-places for bacteria should these gain entrance. Such deposits are hurriedly formed by a pulp which is over-stimulated, and are of little benefit to the tooth.

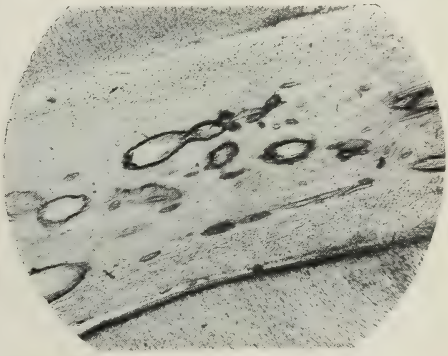
Many instances may be shown of extensive dentin deposition below fillings, as in Fig. 10, in which the pulp is receding beneath a filling and protecting itself from exposure to the recurrent caries which is present. In Fig. 11 an excessive deposit of new dentin is present, the first layer formed being of a good order, while the layer that formed later is of the adventitious variety. This immense deposit, resulting in an almost complete obliteration of the pulp chamber, is probably the result of senile changes, as the injury inflicted upon the tooth by the caries shown in the slide is not sufficient to stimulate so great a formation of secondary dentin. A similar extensive formation of secondary dentin beneath an area of abrasion is shown in Fig. 12. It can readily be seen that in such cases as the last two there is a great increase of dentin and a consequent diminution of the size of the pulp, so that much more extensive operative procedures can be employed in such a tooth than in a normal one.

FIG. 20.



As has been said, not all pulps, even though they be still vital, react to stimuli which induce the formation of constructive and protective dentin. For instance, in Fig. 13 we see a section of an upper canine the entire lingual surface of which has been extensively abraded, so that practically all the enamel has been worn off. Upon examination of the pulp chamber we see that it is practically of full size. The only constructive change apparent is the formation of a very small plug of secondary dentin in the coronal apex of the pulp. This was probably formed very early in the process of abrasion, as a reaction to the first injury. Then the process ceased, and no further protective deposits were formed. We can see, however, in the pulp itself the record of a degeneration which has taken place, resulting in the formation of pulp-stones in the pulp substance. The irritation then stimulated the pulp not to constructive but to degenerative changes.

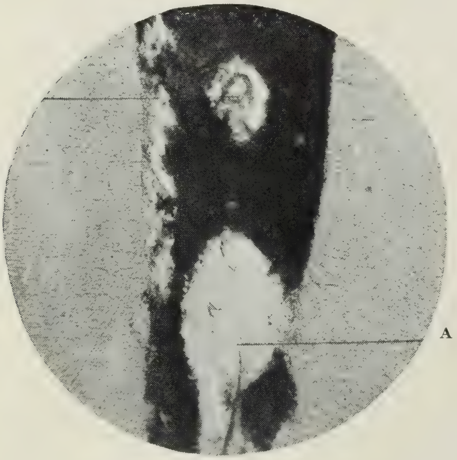
FIG. 21.



In Fig. 14 we see a molar with a coronal cavity in which the pulp is nearly exposed, and yet the pulp chamber is of full size, no secondary dentin having been formed. This pulp had also degenerated, as is shown by the fact that an abscess may be seen in its substance (A). In Fig. 15 an exposure of the pulp has been effected by approximal caries, no secondary dentin having been formed. As in the former case, degeneration of the pulp and formation of an abscess in its substance has been produced.

These observations show that there is a great variance in the reaction of pulps to stimuli, dependent upon the health of the pulp and the health and age of the individual. A stimulus of a mild character may produce constructive changes of a protective nature, but if this stimulus be increased, the pulp may cease to repair, undergoing degeneration instead. So, also, an irritation which will produce constructive changes in one tooth may cause degeneration in another.

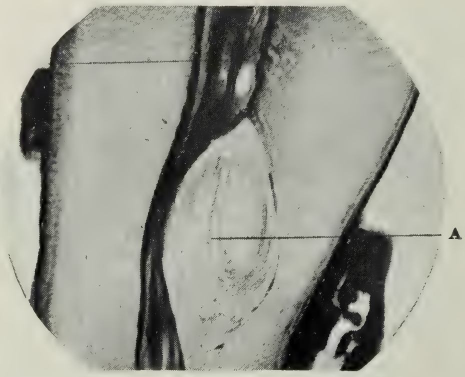
Fig. 22.



PULP-STONES.

Degenerations of the pulp due to stimuli may assume a number of forms, many of which are similar to inflammation and death of other tissues of the body, but, as has been mentioned, these degenerations tend toward calcification, *i.e.* the formation of various kinds of concretions in the substance of the pulp. One of the commonest forms is that of pulp-stones, which are irregular nodules of calcific material varying in size from minute granules to large masses which fill the pulp chamber. In Fig. 16 we see a group of small concretions lying in the pulp tissue. This case presents an early stage in the formation of pulp-stones, which might have grown and united to form a mass of considerable size had the process continued. All such masses have their beginning in a group of dead cells, which seem to have an attraction for the calcific material in the blood. These then form a central nidus about which the calcific material is deposited in concentric layers. A high-power photograph of such a pulp-stone is shown in Fig. 17, in which the concentric arrangement of the deposit is seen.

Fig. 23.



By continued growth the pulp-stones may attain such a size that they seriously interfere with the circulation of the blood, and produce pressure upon the sensory nerves of the pulp. As a rule pulp-stones are not attached to the wall of the pulp, but are movable in the tissue. In many instances, when the stone is large, it may act as a valve, which is displaced to allow the blood to come into the pulp chamber and then drops back to position, and in so doing shuts off the exit of the blood, resulting in a continued internal pressure in the pulp. By this mechanical and physical interference with the functions of the pulp considerable disturbance is set up, and pain, either direct or referred, is produced.

In Fig. 18 we have an instance of the occlusion of a pulp chamber by secondary dentin and a pulp-stone, and in Fig. 19

we see the same result produced by less secondary dentin and a larger pulp-stone. In both cases almost complete atrophy of the pulp has occurred in the chamber, and the pulpal portions situated in the root-canals are probably in an advanced state of degeneration. In no sense can these formations be looked upon as beneficial, but they are analogous to the calcific degenerations taking place in other tissues of the body.

CALCIFIC DEPOSITS IN ROOT-CANALS.

Pulp-stones do not form or extend into the root-canals to any considerable distance, being confined as a rule to the pulp chamber. We often find, however, calcific degeneration taking place in the canals of both single and multi-rooted teeth. These formations consist usually of rough, irregular deposits of calcific material, beginning in areas of degeneration by the deposition of small granules. These granules increase in number and by uniting in groups form masses of various shapes and sizes. The deposits may be round, oblong, or irregular, and of sufficient number to impart rigidity to the pulp tissue, so that a pulp affected with such a degeneration will often be harsh and stiff, and may be removed from the canal in one piece. Figs. 20 and 21 present two cases of calcific degenerations of the pulp such as may frequently be met with.

Should these nodules become very large, or become attached to the dentin, as is the case in Fig. 22, A, they might offer considerable difficulty in the extirpation of the contents of the root-canal. In this connection it might be of interest to note the peculiar formation in a root-canal shown in Fig. 23. At A we see a large concretion resembling adventitious dentin which has formed in an excavation of the primary dentin. This may have been a developmental defect in the dentin or an excavation of normal dentin by odontoclasts under irritation; in either case, the subsequent filling of the defect was connected with excessive action, so that the new formation extended out into the root-canal. The extension pulpward has been so great that the lumen of the canal has been practically occluded, and in such a case it would be difficult to remove the contents of the canal beyond this obstruction. It is not certain how frequently these various canal concretions occur, but these, as well as pulp-stones proper, are doubtless the result of chronic irritations; they are a menace to the health and function of the pulp, and increase the difficulty of pulp extirpation.

We have seen, therefore, that the calcifications produced in and by the pulp may be beneficial to the pulp and to the tooth, or they may be detrimental to the pulp and useless to the tooth. Whenever we make an operation upon a tooth, we must, whether we realize it or not, take into account the calcific depositions. If calcifications are present and they are of a good order, we may extend our reparative measures much deeper into the substance of the tooth than otherwise. If protective calcifications do not occur, the pulp is readily exposed, which necessitates its removal. The presence of pulp-stones and other calcific deposits of a non-protective order manifests itself by neuralgic and referred pains, requiring pulp extirpation. We should therefore bear in mind the relations of these concretions to our clinical procedures, judging the depth of dentin by the history of the case, the general appearance of the patient, and by carefully testing the reactions of the pulp to stimuli, by which means we may determine the effect which the artificial medium we insert will have upon the pulp. By such observation many healthy pulps may be saved to lend strength and vital force to the teeth, and many diseased or useless pulps will be removed.

A CRITICISM OF A PAPER BY DR. LAWRENCE W. BAKER

ENTITLED

"A Preliminary Study of the Influence of the Forces of Occlusion on the Development of the Bones of the Skull." *

By **WM. BEBB, D.D.S., Los Angeles, Cal.**

IN the February 1911 number of the *Items of Interest* an article was published with the above title. This essay was erroneously credited to Dr. Chas. A. DuBois, having been written by Dr. Lawrence W. Baker.

In this criticism it is not my purpose to discourage Dr. Baker in the work which he has undertaken; experimentation should be encouraged and not discouraged. Dr. Baker should have full credit for the labor which he has put upon this investigation. However, so many apparent errors have crept into the essay that to permit them to go on record without further consideration would be an injustice to the essayist and to the dental profession.

It appears to me that this paper was written without due experimentation; that the essayist has not gone deeply enough into the study of comparative anatomy; that the principles of variation in application to the theory of heredity have not been sufficiently considered.

It is true that Dr. Baker said that this was only preliminary to further investigations which he was making; but, emanating as it does from the laboratories of the Harvard Dental School, and consequently with the stamp of approval of this great university upon its pages, one would naturally expect to find this paper flawless, or as nearly so as it is possible to make any scientific deduction.

That Dr. Baker's conclusions were reached without sufficient experimentation I think he himself would admit.

I doubt the possibility of arriving at the conclusions which he presents from a study of the few specimens he had under observation. In going over his paper I have had access to fifty-two crania of the *Leporidæ* (rabbits) contained in my own collection, and to those in the museum of the college, specimens of my own collecting. Even with this amount of material at hand, I would not feel justified in drawing definite conclusions upon any disputed question.

I doubt whether one could say, without going into the matter very thoroughly, whether these conditions which the essayist has endeavored to prove were due to mechanical interference or to the variations which under normal conditions are found in a given species. Suffice it to say that some of these specimens which I have examined, which have been collected in their native habitat and are apparently normal in every respect, show conditions equally as pronounced as those of the rabbits operated upon by Dr. Baker.

Note the variations as shown in Fig. 1. This illustration was taken from "Bulletin No. 29 U. S. Department of Agriculture, Department of Biology."

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* Acknowledgment is hereby made to the George H. Cushing Museum and Library, Dental Department of the University of Southern California, for the use of valuable material and data.

These are typical specimens of *Lepus Americanus Virginianus.* Observe the marked variations. In the middle specimen, if the line of union of the nasal bones were followed, as in the photographs shown by Dr. Baker, the deflection would be very pronounced.

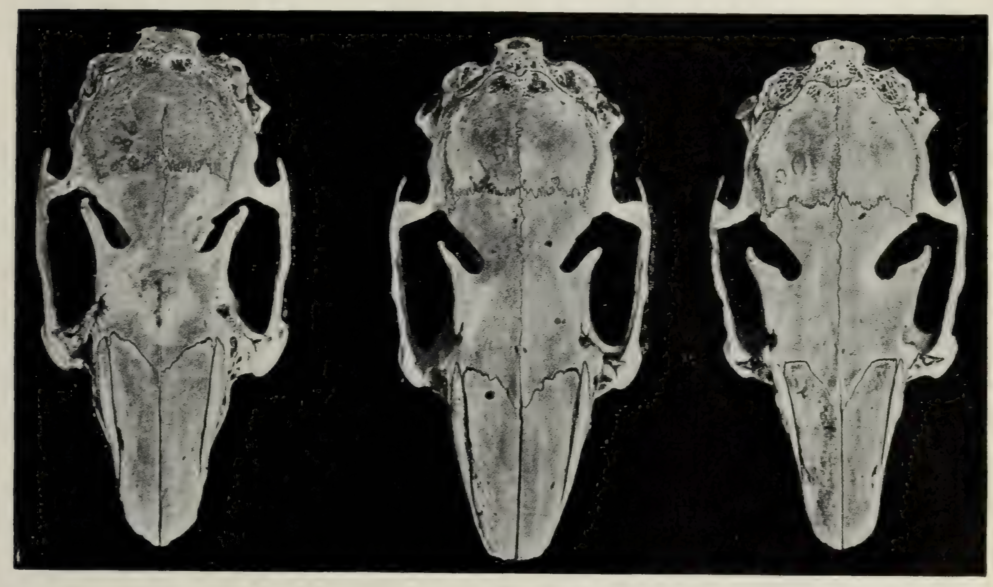
There is a tendency among scientific observers—and I am quite willing to admit that I am not above reproach in this regard—unintentionally or otherwise, to make their experiments coincide with their preconceived notions rather than to be governed by the facts. If I am not much mistaken, Dr. Baker has tumbled into this pitfall.

This tendency is clearly and beautifully expressed in the following words of Thomas Huxley:

> Science warns me to be careful how I adopt a view which jumps with my preconceived notions, and to require stronger evidence for such belief than for one to which I was previously hostile.
>
> My business is to teach my aspirations to conform themselves to fact, not to make facts harmonize with my aspirations.
>
> Sit down before facts as a little child; be prepared to give up every preconceived notion, follow humbly wherever and to whatever abysses nature leads, or you shall learn nothing.

It seems to me that Dr. Baker has drawn the lines upon his specimens in such a way as to exaggerate the conditions which he had hoped to find rather than in harmony with scientific accuracy.

FIG. 1.



Skulls of *Lepus Americanus Virginianus*, showing individual variation. (Plate II, "North American Fauna No. 29," U. S. Dep't of Agriculture, Biological Survey.)

In taking measurements of human crania certain fixed points or rules have been established, but even these are not always constant or absolute. The essayist in his drawings has established for himself points of measurement which are of extremely doubtful constancy.

The median suture of the nasal bones and the other points selected by Dr. Baker are subject to variation to an extent that invalidates them as supports for his conclusions, and make the latter of little scientific value.

We are told* that—"The skulls of the

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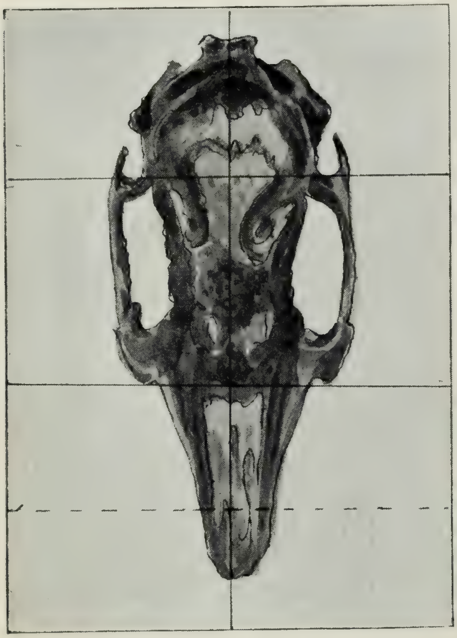
* "Bulletin on North American Fauna." Nelson.

rabbits vary with age and sex;" that "the characters which are most marked and which serve best for comparison are the size of the audital bullæ; the size, form, and relative position of the supraorbital processes, and the size and form of the rostrum and the brain-case."

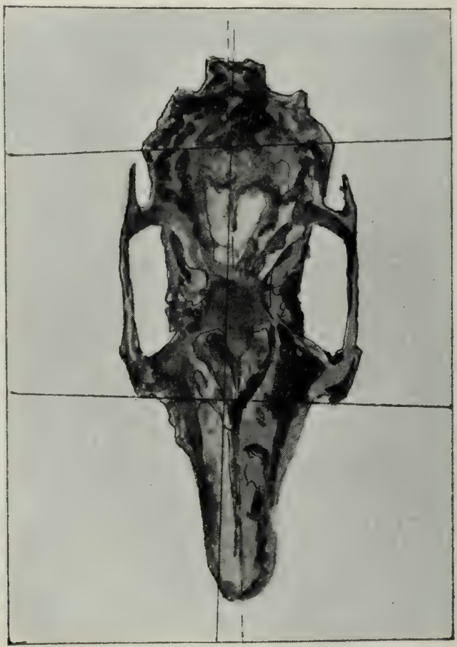
But even admitting the points selected by Dr. Baker to be of sufficient accuracy for us to draw from them scientific conclusions, it still can be shown, I think, that the ground for the arguments which he presents is not well taken.

Fig. 2. ["7."][*]



Upper aspect of the skull of a normal rabbit.

Fig. 3. ["12."]



Upper aspect of the skull of operated-on rabbit.

Examine Fig. 2 ["Fig. 7" of Dr. Baker's illustrations], the "control" specimen. You are asked by the essayist to "observe the normal development of each lateral half of the skull." It is doubtless true that it is "normal," but it does not require a very close examination to discern many differences in the lateral halves. I would call attention to but one, and that is at the point on the nasal bones where I have drawn the dotted line.

The width on one side is 4.3 mm., while on the other it is 3.3 mm. If I correctly interpret Dr. Baker's arguments, one should find these lateral halves to be equal, unless they have been interfered with by an operation.

I do not understand why the line in Fig. 3 ["Fig. 12"] was drawn as shown. Would it not be just as fair to place it as I have indicated? If the latter method be pursued, the deflection due to interference becomes well-nigh imperceptible; or, to carry the test still further, ignore all lines and produce outlines. Doing so, it would be impossible to say which is the "control" animal, and which is the one operated upon.

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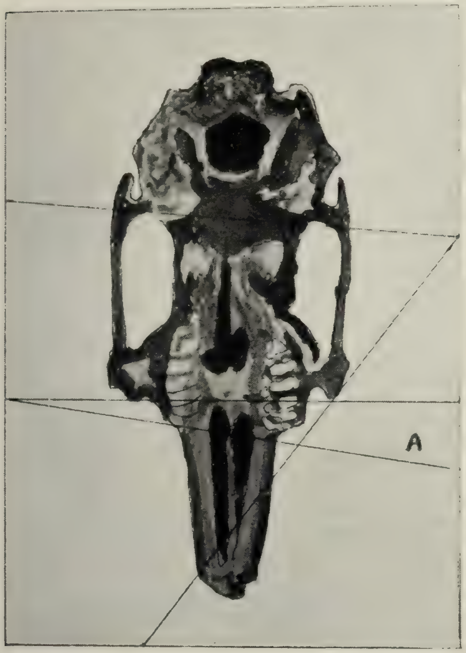
[*] Owing to my not being able to obtain the original photographs of Figs. 2–5, these illustrations were made from drawings of the same. All *dotted* lines have been drawn by me; the solid ones are Dr. Baker's.—W. B.

Again, in Fig. 4 ["Fig. 13"] it will be observed that a line (A) has been drawn presumably across the cutting edges of the first premolars, to demonstrate the point under consideration. If my eyes do not deceive me, this line has been made to run from the cutting edge of the first premolar on one side to the point where the opposite one, ground down, emerges from the process. Examination of a specimen of this order will show that the first premolars deflect backward from the point where they emerge from the process to their cutting edges, to the extent of one millimeter or more. This alone would account for the deflection of the line which the essayist has drawn.

Fig. 4. ["13."]

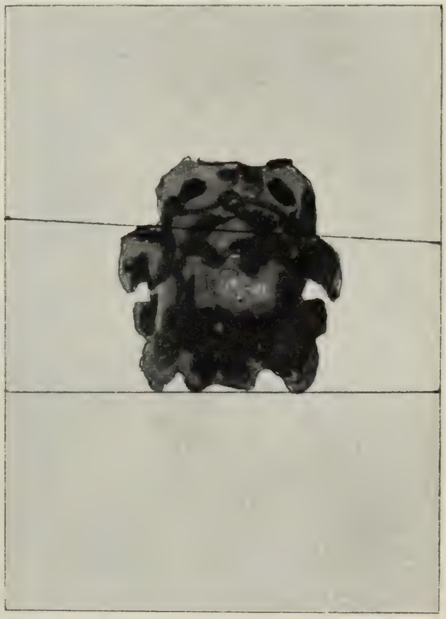


Lower aspect of Fig. 3.

I have grave doubts whether in Fig. 5 ["Fig. 14"] the conditions shown would prove the assertions made—viz: "This photograph shows clearly the far-reaching influence of the use of the teeth in the development of the bones of the skull, for the most remote bones from the teeth have been perceptibly varied by interfering with their function."

With but one specimen to prove this statement, and with a variation not greater than one might find in a normal specimen collected in its native habitat, it seems to me that the essayist has made an assertion which an examination of the facts will not bear out.

Fig. 5. ["14."]



Posterior aspect of the skull of an operated-on rabbit.

It is not possible to attach much importance to his table of the relative weights of the skulls shown. In the first place, the sex should have been indicated. Second, it should have been noted that one specimen, No. 5, was killed two weeks earlier than the animal from which the "control" skull was taken, and that the former is 5 mm. shorter over all than the latter.

All else being equal, specimen No. 12 (Fig. 3) and the "control" might easily have varied five grains in weight, owing to the fact that one had been carried to a greater point of desiccation than the other. A small difference in the amount of membrane removed from the nasal fossæ, which clings to the turbinated bones and is extremely difficult to dissect out, would also account for this difference.

That these experiments may become of permanent value, I would suggest—

(1) That the experimenter enter into an exhaustive study of the crania in our museums, to establish how great a part variation may play in producing the conditions in question.

(2) That fixed points of measurement, if possible, be established.

(3) That the number of specimens operated upon be greatly increased.

(4) That it be determined which exerts the greater influence upon the parts involved, the incisors or the premolars and the molars. (I believe the former to be more potent.)

(5) That the amount of leverage be determined, for it must not be overlooked that the muscles on the side of the mouth operated upon have a certain amount of weight to sustain. Especially would this be true in the rabbits where the grinding surfaces of the teeth on the two sides are near together, and approach the center of the buccal cavity.

(6) That the extreme delicacy of the crania of the rabbit and their liability to accident be taken into consideration.

(7) That the size and pose of the ears of the rabbits should be considered as influencing the form of the base of the skull.

(8) That it be remembered that domestic and captive animals are prone to disease, which fact might have a bearing. Especially is this factor important while they are undergoing operations.

(9) If the carnivora are to be considered, we should remember that it is well-nigh impossible to find a specimen in the captive or domestic state which does not show evidence of disease of the bony supports of the dental armature.

(10) Let it be remembered that the alveolar process is likely to be first to become diseased among animals in this state.

AMALGAMS: THEIR MANUFACTURE, MANIPULATION, AND PHYSICAL PROPERTIES. CEMENTS: THEIR MANIPULATION AND PHYSICAL PROPERTIES.

By C. M. McCAULEY, B.S., D.D.S., Abilene, Texas.

(Read before Section III of the National Dental Association, at its annual meeting, Cleveland, Ohio, July 25, 1911.)

SINCE the introduction of amalgam as a tooth-filling material, it appears that the dental profession has regarded this subject as being more or less cloaked in mystery. This must be due to the fact that so little was known about amalgam for so many years that men assumed an attitude of carelessness and indifference toward it.

An excellent means to discourage men in any line of endeavor is to convince them at the beginning that "There is no use." Young men who have entered our profession have been told in college that the amalgam question involved many perplexing problems; this has been taught and drilled into them since the beginning of dental teaching to the present date. It is true that there are some questions regarding metals of which we actually know little, and the more we study, it seems, the farther we depart from definite truths. These questions do not concern us dentists, however, as much as do practical and well-established facts. What we should understand are the physical properties of amalgams and their ability or inability to conserve tooth structure. These phases of the amalgam problem have been made perfectly clear, and there is no longer any mystery connected with them. The work preparatory to writing this paper has been undertaken with the hope that some of these questions might be made plainer to some practitioners, that their minds should be put at ease, and their work with amalgams improved. Some important factors associated with selecting an alloy and manipulating an amalgam seem to be overlooked as such by a great many men. In some instances the observance of these factors means economy of time and cost, as well as assurance of improved service to the people.

The history of the amalgam question has been dotted here and there by investigations directed toward improvement. At first the aim of these efforts was better working qualities. This was realized when tin foil was added to coin-silver filings, which were formerly used with mercury. The working qualities were improved by adding tin foil in certain proportions, and then melting this mixture into an alloy; otherwise it was not known what effect the tin foil produced. The questions now to be solved were the cause and correction of such physical properties as were found detrimental to amalgams as tooth-preserving materials. This phase of the question has always received much thought from a great many investigators. All these investigations may be placed in three general classes: namely, (1) The test of time. (2) The chemical theory of alloying metals. (3) Balancing opposing physical properties of metals composing alloys, and taking measurements of all movements found in amalgams while setting.

THE TEST OF TIME.

In the study and experiments here reported I have not overlooked any of these three classes. The first one was only a stepping-stone to higher advancement. Its claims to recognition by scientific men vanished when the germ theory of disease was accepted. It is an undisputed fact that conditions in different mouths are very unlike, and that a filling might stand the test of time in one mouth, and fail in another. The best assurance we may have in our amalgam work against recurrence of caries is the certainty that our fillings will not shrink sufficiently to allow micro-organisms to enter between the filling and the cavity wall, and will not permit sufficient flow to disturb the marginal adaptation. I have made several test fillings of different alloys the claims for the superiority of which are based on the test of time in the mouth, and without exception they have showed sufficient shrinkage to admit caries-producing germs at the margins of these fillings. In addition to this shortcoming, they have proved lacking in strength, and in many cases the flow was extreme. In the arrangement of the formulæ for these alloys, smooth-working qualities and apparently easy manipulation have been the most prominent factors. What is generally regarded as easy manipulation is necessarily antagonistic to the best results, because the factors which render such easy manipulation of an amalgam possible make the stability of the filling in the cavity impossible. It is unfortunate for our profession and for those whom we serve that so large a percentage of the dental alloys that are being offered on the market at the present time are made by manufacturers who base their knowledge on the test of time, and are used by practitioners because of their supposedly easy manipulation. Such practice on the part of the manufacturers is far from scientific, and there is no excuse for professional men using such materials, in view of the knowledge which is within our reach. One of the dearest and most widely advertised alloys was tested, and I found, during the first twenty-four hours, 6/10,000 of an inch, or six points, of shrinkage; twenty points, or 20/1000 of an inch of flow, which is nearly one-fourth its volume, and an average strength of only 236 pounds. Such shrinkage is absolutely fatal. The flow is ten times more than it should be, and the strength only two-thirds as much.

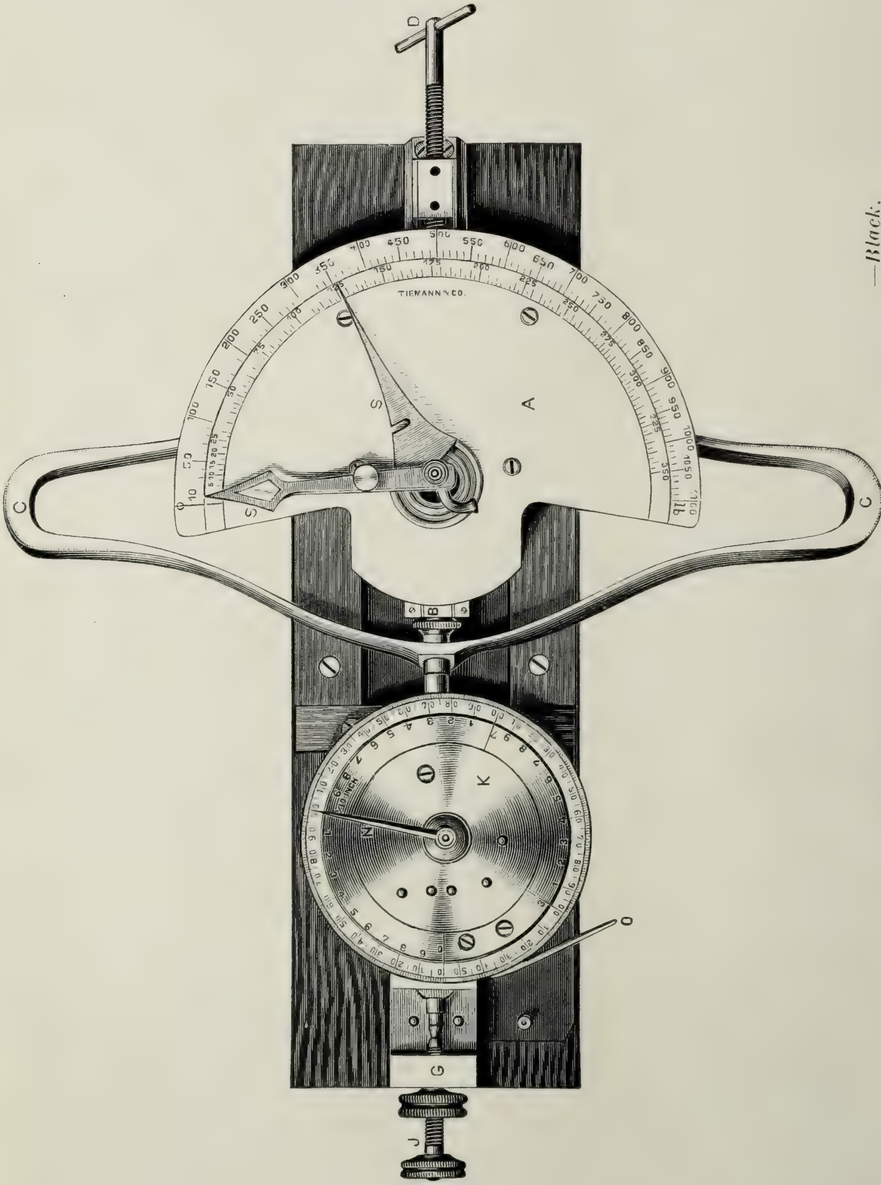


Fig. 1.

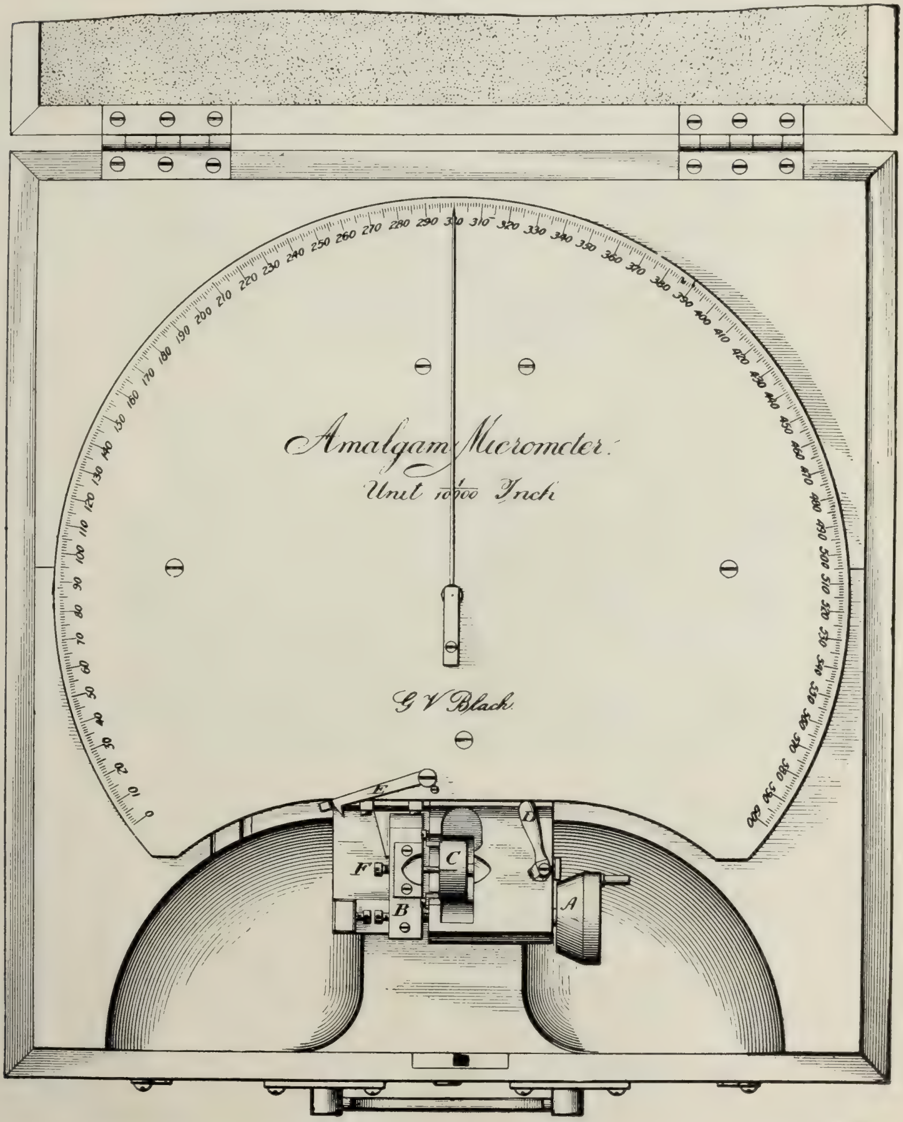
Dynamometer with micrometer attachment.

—*Black.*

THE CHEMICAL THEORY OF ALLOYING METALS.

The chemical theory is based on the belief that the best dental alloys can be obtained only when the metals are combined chemically in the ratio of their chemical equivalence. The claim has been made that this procedure will furnish a combination which will best resist the action of the oral fluids on the surface of the filling, but this seems an unimportant item as compared with the movements and changes of a filling within the cavity itself. The dissolving of metals in each other in such proportions that movements in one will exactly counteract movements in the other will produce a mass which is immovable and strong when made into an amalgam; yet these metals, used according to the idea of one who advocates the chemical theory, will produce a filling which is unstable, both as to shrinkage and flow, and is also lacking in strength. One investigator who has done a great deal of work in this field for many years has concluded that silver and tin, in the ratio of 48 : 52, makes the most dependable alloy for filling purposes. I made an alloy from these metals in these proportions, using care in every detail, but

FIG. 2.



—Black.

Micrometer for the measurement of shrinkage or expansion of amalgam.

measurements revealed a most unsteady condition of the filling, as well as excessive flow and little strength. If this scientist is correct in his conclusion that tin and silver unite chemically in the ratio named above, then it is unwise to accept the chemical theory until much more shall have been learned concerning it. We shall therefore set aside the chemical theory, as it is not only obscure and confusing to men who are not chemists, but it fails to stand the test.

FIG. 3.

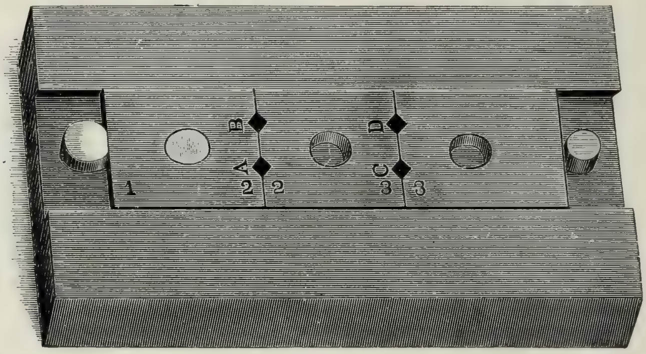
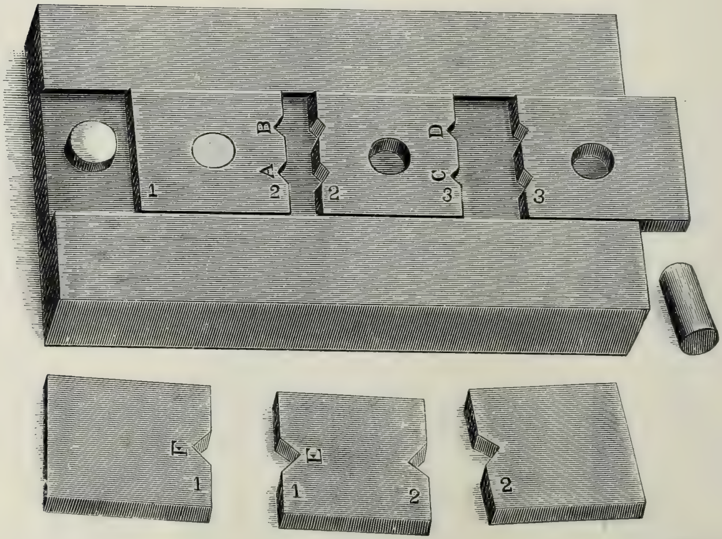


FIG. 4.



—*Black.*

FIGS. 3 AND 4: A steel matrix for making experimental fillings of gold or amalgam. Hardened steel slides are secured in a steel holder and made firm by inserting the steel pin shown at the right in Fig. 4, the pin on the left being immovable. The fillings are made in the holes marked A, B, C, D. These are 8/100 inch cubes. By removing the pin on the left the slides may be separated (as shown in Fig. 4) or removed, and the fillings taken out for examination. The set of slides below in Fig. 4 are for 1/10 inch cubes. Slides for several sizes of fillings may be used in one holder.

BALANCING OPPOSING PHYSICAL PROPERTIES OF METALS COMPOSING ALLOYS.

The third class of tests mentioned was introduced by Dr. G. V. Black. He took up the physical properties of amalgams one by one, ascertained definitely what produced every physical phenomenon contributing to good or evil results in alloys, and pointed out ways and means of correcting the vital faults appearing as he proceeded with his work. His plan was to devise instruments for measuring the movements of amalgams in setting, and to ascertain the strength of the final products. These instruments were scientifically built, and unquestionably work most accurately of any yet made for this purpose. His micrometer (see Fig. 1) is so constructed that the slightest change in volume, expansion or contraction, can be measured, even to the 1/20,000 of an inch. With this instrument minute measurements can be taken with the same degree of accuracy that the mechanic can measure the half-inch or the half-foot. Dr. Black also made a matrix with which fillings could be made of uniform size in the form of a cube. He also built the amalgam dynamometer with which he tested these small fillings (which were 85/1000 of an inch in size) for strength in pounds. To the dynamometer a small micrometer is attached, with a scale made of units of one-thousandth of an inch. This instrument registers the flow under a given pressure within a given time. The binocular microscope was used to verify the work of the micrometer. In all cases where the micrometer indicates shrinkage or expansion in any marked degree, this microscope enables one to actually see the change which has taken place. Black's work throughout was of the most accurate and painstaking character, and up to this date no one has succeeded in disproving any of his conclusions. The results of the following experiments, which were made in Dr. Black's laboratory, conform in every point with his conclusions, and only tend to emphasize their accuracy. (See Figs. 2–5.)

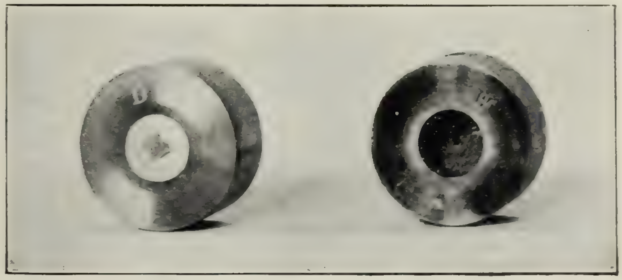
EXPERIMENTS.

Weighing of metals. The metals used in each melting were carefully proportioned and weighed to the accuracy of 1/64 of a grain. The amount made up each time varied from 10 to 30 grams, depending upon the different tests desired.

Alloying. The following is Dr. Black's latest statement regarding the alloying process:

> An alloy is a solution of one metal in another metal, or of several metals in each other. This solution is similar in its nature to the solution of common salt in water. To properly form an alloy, this solution must be complete. That is, every individual cubic centimeter of the salt water, or of the alloy formed, represents the same percentage of its ingredients as the whole of the body of which it is a part.
>
> The alloying of metals must be done in the molten state. Time and agitation enter into the question of complete solution. Yet a high-fusing metal may often be dissolved in a lower-fusing metal without raising the

FIG. 5.



—*Black.*

A, Steel tube with an amalgam test filling. B, Steel tube used for trial fillings.

temperature more than a few degrees higher than the melting-point of the alloy formed. This is done best in the closed crucible in an atmosphere of hydrogen, to prevent oxidation.

The metals enter into solution one with another, or several together, in all proportions, only some differences in readiness of solution being noted. In this solution there seems to be no question of chemical union of the metals.

The formation of eutecticons in alloys of metals, when overheated, is a frequent occurrence. In this two or more alloys are formed in the mass, differing in the percentage of the metals contained, and in the fusing-points. To the ordinary observer this may be seen by re-melting the alloy under favorable conditions for observation, and closely observing its behavior. If there are no eutecticons, all of the mass will melt at one degree of heat. If there are eutecticons, the lower-fusing alloy will become fluid at a certain degree of heat. The particles of the higher-fusing alloy will be afloat in this, but not melted. This may be so abundant as to give the metal a doughy consistence at this stage; then a higher degree of heat is necessary to melt this higher-fusing alloy and render the melt complete. The condition of the metal when between the two melting-points will vary as the lower and higher melting portions differ in abundance. Dentists in using die and counter-die metals observe this condition often in the alloys that have been melted many times.

A precisely similar thing occurs in solutions of salt in water, when cooled several degrees below the ordinary freezing-point of water. A portion of water will freeze. This frozen portion is found to have only a certain comparatively low percentage of salt, while the remaining mother liquor is richer in salt.

There is no other use of alloys in which attention to all of these details in forming them is so important as for amalgam-making. Any change in the alloy from the perfect result changes its relation to mercury; and especially any failure in obtaining a perfect solution of each metal in the other, or leaving some portion as a mixture instead of a solution, so changes its relation to mercury as to destroy that perfect balance of metals on which the accuracy of results depends.

Unless the factor of perfect alloying is carefully observed, the ingot will not be of uniform proportions throughout, and the filings cut therefrom would not be of uniform proportions and physical properties. Care must also be used to prevent waste by oxidation during the heating process, because the slightest difference in degree of oxidation in the metals would change the proportions which have been so carefully weighed before beginning, and in dental alloy-making the proper proportioning of metals means very much indeed. Oxidation was prevented in these tests by using a closed electric crucible with a gas-pipe fitted in the top, through which hydrogen was permitted to flow during the melting process. The gas drives out the oxygen and flows over the surface of the metals during heating. The heating device consisted of two rheostats so connected that the current could be controlled so as to pass by sixteen steps from the melting-point of tin to the melting-point of gold, thus permitting of more gradual heating. This apparatus, after a little practice, will enable one to judge very closely the proper degree of heat to be used each time for procuring a perfect alloy, yet not so high as to disturb the balance in the metals by the divisions known as eutecticons.

Filing and annealing. After pouring and cooling the ingot, the filing is done slowly to prevent heating by friction. The alloy is next sifted through a fine sieve to remove the larger fragments, and a magnet is passed through the filings to remove small particles of steel. One-half the filings are then placed in a bottle and labeled "Fresh-cut," and test fillings are immediately made therewith. The rest of the filings are annealed.

Aging of alloys. It has long been known that alloys undergo a change with age. Different reasons have been advanced for this change. Some still believe that it is caused by oxidation of the fillings of alloy from exposure to the atmosphere. This is an error. Dr. Black has proved beyond any question that this change is produced entirely by heat. The degree of the aging is dependent upon the degree of heat and the length of time. Exposure to the air produces no change unless heat is present. In the same way agitation in the bottle produces no change, unless heat is present. Inasmuch as heat proved to be the only factor in this change, Dr. Black termed it simply tempering or annealing of metals. All commercial alloys must be annealed before being placed on the market, in order to render their physical properties as permanent as possible. A fresh-cut alloy, which will make a good amalgam immediately after cutting, will show marked shrinkage after a few months. If the alloy is fully annealed, the maximum shrinkage will occur at once, and no further movement will appear. If the alloy is partly annealed, only part of the shrinkage is overcome, and age will continue to change the alloy until it is fully annealed. Many tests for determining the degree and time of heat for proper annealing have been made, and it has been determined that shrinkage decreases as the fillings are heated in boiling water, up to fifteen minutes. Longer boiling does not produce more shrinkage, but it will cause slower setting and less strength in the amalgam. The stage of annealing at which no further shrinkage appears Dr. Black has termed the "zero point" of annealing. A balanced formula annealed to this point is rather quick-setting; if the alloy is annealed beyond this point, setting is effected more slowly; therefore any first-class alloy must be quick-setting.

After alloys are correctly annealed, time or age continues the process of weakening or softening. The best alloys to be had will finally grow so old standing on the shelf or in the cabinet that their utility will be destroyed. Alloys should never be used after one year from the time of cutting and annealing. Our only means of protection in this respect is to refuse to accept a package of alloy unless the date of manufacture is plainly stamped thereon. Slow setting is an evidence of over-aging; also the percentage of mercury required diminishes as the age of the alloy advances.

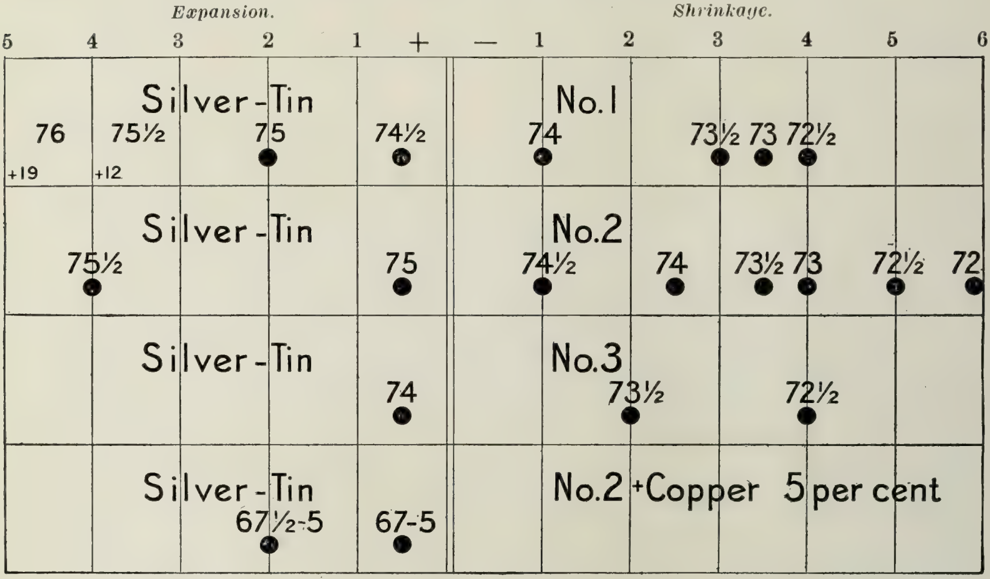
TESTS.

The series of silver-tin tests selected for this work was begun with 40 per cent. silver and 60 per cent. tin, and the silver scale was advanced 5 per cent. at each melting. Thus the amount of silver increased 5 per cent. each time, while the tin decreased 5 per cent. This series was to determine the proportion of these two metals which would produce the greatest number of desirable and the smallest number of faulty physical properties.

Expansion and shrinkage. Liquid metals possess the property of changing their volume when passing into the solid state. Some expand and others shrink. In the case of silver and tin, the one expands and the other contracts. The object of this test was to locate the precise place on the scale where the expansion of silver will overcome the shrinkage of tin and produce an immovable mass. It has been stated that aging or annealing causes shrinkage, hence it became necessary to make tests both of fresh-cut and annealed alloy from each melting. A filling of each was made in the Wedelstaedt tube after the formula of 40 per cent. silver and 60 per cent. tin, measured in the micrometer and recorded. These tubes were measured again every few hours at first, and once a day after two days. Both fillings showed shrinkage, which indicated a need of more silver. Fillings were next made from an alloy of the formula 45 silver, 55 tin. Shrinkage was still present, but was seen to be a trifle less than before. This advance on the silver scale of 5 per cent. at each melting was maintained until the formula 65 : 35 was tested. At this point shrinkage in the fresh-cut disappeared, but the filling made of the annealed alloy shrank eight points. Around this point on the scale a good alloy could be made if used fresh cut. Fresh-cut alloy being impracticable, on account of age producing shrinkage, unless used the same day it is cut, further search was made for the point of no shrinkage or expansion in the annealed alloy, or the point of balance, as we shall hereafter term it. Going up the scale 5 per cent. each time, leaving out the report of the record of the fresh-cut alloy, at 75 : 25 shrinkage had ceased and expansion appeared. Going back to the formula 70 : 30, shrinkage of $5\frac{1}{2}/10,000$

of an inch was noted. It now seemed evident that the balance point lay somewhere between 70 per cent. and 75 per cent. of silver. A filling of alloy of the formula 72½ : 27½ was made, and slight shrinkage was still noted. I now determined to go up the scale one-half of 1 per cent. each time, carefully testing all the way, until the balance was reached. The shrinkage gradually disappeared, growing a little less each time one-half of 1 per cent. of silver was added. At 74 per cent. silver, 1/10,000 of an inch, or one point, of shrinkage appeared. At 74½ per cent. of silver, no shrinkage occurred, but instead a half-point, or 1/20,000 of an inch, of expansion occurred. The precise balance lies between these two points, 74 and 74½, but as a half-point of expansion is rather to be desired, this formula of 74½ : 25½, when found to remain unchanged in the cavity for ten days, was recorded.

Diagram showing Expansion and Shrinkage, in Points.

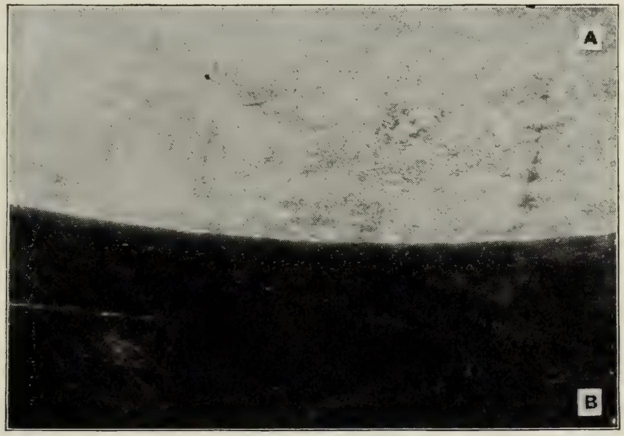


Dr. Black has said that no set formula can be relied upon because of the different degrees of fineness existing in the commercial metals. To determine the accuracy of this conclusion, I procured some more metals from a different source, and made a number of fillings, ranging in proportions of silver both above and below the formula already found, these fillings differing from one another in the amount of silver by one-half of 1 per cent. In the case of metals No. 2, the formula established for metals No. 1 showed shrinkage of one point, and the balance was located at 75 per cent. silver, 25 per cent. tin. In a third lot of metals I found the balance point at 74 per cent. silver. The figures in the accompanying table most clearly show this gradual approach to and from the balance point.

The above diagram seems to illustrate plainly three facts: First, that the balance point in alloys can be precisely located; second, that a variation of one-half of 1 per cent. from this point may produce very detrimental properties; third, that a scientific alloy made from a set formula is an impossibility when commercial metals are used.

The lines on the right and left of the double line represent points. The dots are so located as to show the number of points of expansion or shrinkage. The figures near the dots represent the percentage of silver, the remaining percentage in each case being tin.

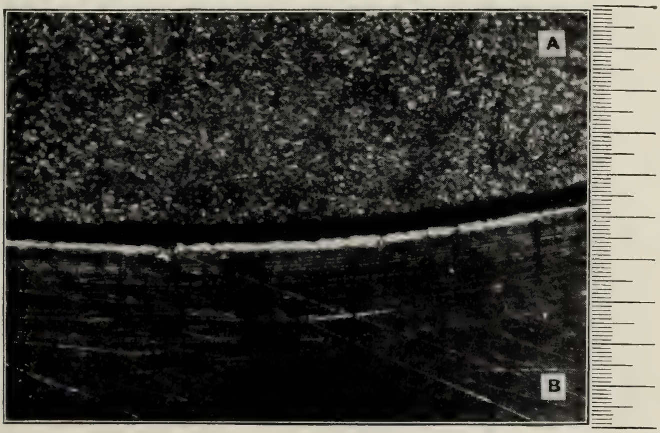
FIG. 6.



—*Black.*

Showing segment of the margin of an amalgam filling in steel tube. (Enlarged 54 diam.) A, Amalgam. B, Steel tube. (This amalgam shows no movement.)

FIG. 7.



—*Black.*

Showing filling in steel tube. (Enlarged 54 diam.) A, Amalgam. B, Steel tube. The scale is also attached. Such shrinkage is common with annealed amalgam composed of silver and tin, varying from 50 to 65 per cent. of silver. Adding gold, platinum, or copper gives but little change in the results.

This point of balance has been found as low as 72½ silver by Dr. Black. It may readily be seen that any set formula adopted between 72½ silver and 75 per cent. silver might be good or might be very bad. Hence, as Dr. Black has formerly concluded, the only scientific method of arriving at correct proportions consists in working out the balance in the manner indicated above, and securing a separate formula for each lot of metals procured from the market. Even a silver shortage of one-half of 1 per cent. will allow shrinkage sufficient to destroy the utility of a filling, regardless of the degree of skill used in placing the filling in the tooth.

To be inaccurate the 1/10,000 of an inch in the movement of a filling may ruin the filling. If the balance point is missed by one-half of 1 per cent. in the proportion of the metals, this degree of inaccuracy will be produced. Hence, in order to obtain a perfect filling, the alloy must be scientifically balanced. There is no other known way of finding the balance point in alloys of metals except that discovered by Dr. Black, which requires very close measuring, together with the most accurate technique in making the alloys. Therefore we may conclude that the alloy-maker, however skilful he may be, cannot make a scientific alloy without the aid of such instruments as will detect the slightest movement in an amalgam while setting.

The maker who still uses the test of time as his guide is groping in the dark. His work is all done by guess, and is bearing such fruit as is seen in the failing of all amalgam fillings for which his alloys are used. There are less than a dozen amalgam makers in the business at this time who are known to possess the instruments necessary for making scientific alloys. The practice of following a set formula in manufacturing an alloy is pernicious, and should not be tolerated by the dental profession.

The effect of the shrinkage of amalgam fillings is discoloration and recurrence of caries. (See Figs. 6 and 7.)

Shrinkage of one point as shown by the micrometer measurement may produce a ditch between the filling and the cavity wall as wide as one ten-thousandth of an inch. The micro-organism which produces caries measures from four-tenths to eight-tenths of a micron, the micron being 1/1000 of a millimeter or 1/25,000 of an inch. Therefore the micro-organism measures from 1/65,000 to 1/32,500 of an inch, and a few figures will reveal the fact that one point of shrinkage will open up a passage sufficiently large to admit from three to six of these offenders side by side.

Even less than one point of shrinkage will admit micro-organisms, and caries may begin again where the cavity margins cross a susceptible area. The question therefore arises as to what should be done with the vast number of commercial amalgams which shrink from 1 to 15 and even 20 points.

Discoloration is caused by the ingress around the filling of moisture laden with hydrogen sulfid, which is found in all mouths. Sulfid of silver in the case of silver-tin alloys, and sulfid of copper in amalgams containing a large percentage of copper, are the results. These compounds are very dark in color. It will be noted that a space must be present for the entrance of this moisture. This space is created by faulty manipulation or shrinkage in the amalgam. Moisture may enter a space which is too small to admit micro-organisms, hence discoloration may occur without caries; but in either case the space exists first. The measurements given here are inconceivably small when compared with a unit so coarse as the inch or even the millimeter. It must be borne in mind that we are dealing with a microscopic object when speaking of micro-organisms, and that small units must be used in measuring their dimensions, and highly magnifying lenses in studying them. The same unit should be used in measuring the opening through which the micro-organism is destined to enter, set up his deadly work again, and bring to naught the good which we thought our skill had wrought. No degree of skill on the part of the operator can possibly overcome the shrinkage of an amalgam.

Strength and flow. Cubes for testing strength and flow were made from each alloy of the above series in which search was made for the balance point. These cubes were 85/1000 of an inch in size. In the test for expansion and shrinkage an unsteadiness was noted to exist in the filling. Shrinkage would continue for a time, then expansion would set up and continue for awhile. Possibly one day expansion would show and the next day shrinkage. This unsteadiness gradually disappeared as the point of balance was approached, and appeared again after this point was passed, either up or down the scale. The maximum strength and the least flow seemed to be just around the point of most perfect steadiness. Cubes of 85/1000 of an inch in size made from alloy of a balanced formula withstood as much as 450 pounds of pressure, while alloy made after the chemically balanced formula broke at less than 200 pounds.

By *flow* is meant the gradual moving out of an amalgam from under pressure, either constant or intermittent. A block of tin of 85/1000 of an inch in size, when subjected to 100 pounds of pressure, will soon be reduced to a thin sheet. Silver will not flow; a certain pressure will flatten a silver block to a certain degree, but after that no further movement will occur, unless the pressure is increased. The flow of amalgam, next to shrinkage, is perhaps its most fatal defect. Some commercial amalgams showed as much as 20 per cent. of flow under 50 pounds of pressure applied for a period of one hour. Amalgams made from scientifically balanced alloys will show only from 1 to 3 per cent. of flow under the same pressure applied for the same time.

MODIFICATION WITH OTHER METALS.

Many modifying metals have been tried in connection with the silver-tin alloys. Copper so far has been found to be the only metal that improves the amalgams. Any other metal used as a modifying metal has so far proved to be actually detrimental. Some of the metals will not readily enter into the alloy solution, and consequently are very difficult to distribute evenly in the melting. It is thus readily seen how different parts of the ingot will make fillings containing different proportions of the metals. When these proportions are at variance, the physical properties shown in the fillings are different, and the fillings seem to acquire again that unsteadiness which occurs above and below the balance point. Zinc is very unfavorable in its action upon other metals in a dental alloy. I made two fillings containing only 1 per cent. of zinc. They behaved very well under the ten days' test at first, but measurements made three months later showed nearly 100 points of expansion. Too much mercury will also decrease the strength and increase the flow of an amalgam. The substitution of 5 per cent. of copper for an equal amount of silver increases the strength of amalgams made from silver-tin alloys.

MANIPULATION.

Manipulation has proved to be an important factor in the production of good amalgam fillings. It seems to have no effect on shrinkage and expansion, but strength and flow are largely controlled by the manner of manipulation. Adaptation to the cavity walls and margins, and finish, are entirely dependent upon the operator. These qualities of an amalgam filling are best accomplished—First: By using the proper amount of mercury. Second: By proper amalgamation. Third: By proper packing within the cavity. Fourth: By proper adaptation to the margins. Fifth: By proper finishing.

The mercury and alloy should be weighed and put up in separate capsules of convenient sizes. This will be found economical practice because of the saving in both ingredients. Better strength and less flow result when the proper amount of mercury is used. A deviation in either direction of more than 5 per cent. from this proper amount produces perceptible weakening and increased flow. The assistant or the operator himself can weigh out these capsules at odd times. The correct percentage of mercury varies from 35 to 65 per cent. or more, depending upon the alloy used. Alloys of a high percentage of tin require less mercury. A balanced alloy made of silver and tin with 5 per cent. copper, when freshly made, will require about 55 per cent. of mercury.

Amalgamation should be started in the mortar or finger stall. When the mercury has taken hold of the alloy, the mixture should be removed to the palm of the hand and kneaded briskly. At first the mass will seem to be lacking in mercury. The kneading is continued for a few moments, when the mercury will begin to appear on the surface. Soon there may appear to be an excess of mercury. The kneading is continued from this point until crystallization begins, which is indicated by a crackling sound; at this stage there should be no shortage or excess of mercury; if, however, the amalgam should seem a little too wet, the excess mercury is squeezed out in the usual way.

The packing of the amalgam into the cavity is more perfectly accomplished at this point of its plasticity than at any other. The operator should use as large pieces as will readily enter the orifice of the cavity, and apply all the pressure at his command, using the pen grasp. A large serrated point should be used. A matrix is absolutely necessary in all approximal cavities. Perfect adaptation to the cavity margins is more difficult to obtain with amalgams than some operators appreciate. Proper plasticity, acquired by the right amount of mercury, is our greatest aid in obtaining good margins. If the amalgam contains too much mercury, it will draw away from the margins; if not enough it is very difficult to press it well against the margins, especially the approximal and gingival ones, overlapped by the matrix. This consideration alone will repay one for the time and trouble of weighing the ingredients for all amalgam fillings.

Dr. Black's solution of the amalgam problem has rendered a vast service to our profession; to him belongs the credit of indicating a scientifically balanced alloy. The full measure of good done by his labors will not be thoroughly realized by the profession, however, till dentists become familiar with the working properties of properly constituted and balanced alloys, and discard such alloys as are soft and velvety to the touch, and seemingly easy to work. The dentist who selects such an alloy for amalgam fillings is laying the foundation for future troubles, which are sure to come. I have known cases where a practitioner rejected an excellent alloy and chose in its stead one which was quite inferior, yet could be manipulated in a manner to suit his fancy. Such practice is unscientific and below the dignity of one who is affiliated with a scientific calling.

Cement.

In the work which I have conducted at different periods for the past two years on the physical properties of dental cements, nothing has been learned which has not been heretofore published. I have made, however, many comparative tests of the properties of a few of the leading cements on the market, which I submit here with the hope that some good may be derived from these observations. I mean by "leading cements" those of which dental supply houses report the largest sales. These tests were first made for the Texas State Dental Association, and were confined to the cements enjoying the widest sale in that state.

When one attempts the study of dental cements many obstacles rise in his way, chief among which is the fact that the medium in which the cement is placed after mixing has so much to do with its properties and actions, and that the media in which our tests are made are so different from the conditions present in the mouth.

The tests made for expansion, shrinkage, and porosity are perhaps less subject to criticism than those made for strength and adhesion. I have reason to believe that cements are stronger in the mouth than in dry surroundings. When cement is examined under the microscope, crystallization is seen to continue for many days. If by this crystallization, which goes on in the presence of a proper amount of moisture, the strength of a cement is increased, the above supposition is true. In a dry medium, however, the greatest strength is shown after from twenty-four to forty-eight hours.

Unfortunately, we cannot manipulate

cements with the same degree of certainty as to results as we can amalgams. For amalgams a scientific procedure has been established, where training in the senses of touch and sight is of secondary importance, while with cements these items are of first consideration. We cannot weigh our ingredients and proceed by a definite plan when mixing cements. We must determine the proportions as well as the technique of procedure by guess. The more we observe all these factors and compare results, the better shall we be able to guess what is best. This indicates how far from a scientific basis we still are in our manipulation of dental cements.

MANIPULATION.

In mixing cements different methods of procedure have been observed, and the results noted. Rapid mixing does not seem to produce the chemical action which is necessary between the powder and the liquid to impart the highest degree of strength. Gradual incorporation of the liquid and powder produces more strength than rapid mixing. Time sufficient for the formation of the necessary zinc phosphate must be allowed during the mixing process.

The best results have been obtained when the powder was carried into the liquid in several separate portions, and each portion spatulated until perfect smoothness was produced.

Stiff mixtures for filling purposes show approximately 20 per cent. more strength than those thin enough for setting crowns or inlays.

TESTS FOR EXPANSION, SHRINKAGE, AND POROSITY.

The tests for expansion, shrinkage, and porosity were made by placing the fillings in the ends of small glass tubes and subjecting the fillings to moisture. This was accomplished by placing the filled end of the tube in a bottle containing water. The tube was held in position by passing it through a perforated cork. Eosin solution was then placed in the glass tube above the filling and the tube sealed. Protrusion of the filling from the end of the tube would indicate expansion, while shrinkage would be shown by the eosin solution passing down between the filling and the tube into the water below. When the eosin solution penetrated into the substance of the filling, porosity was present.

The following is a tabulated comparison of the above three properties, as indicated by the tests made:

CEMENT.	Expansion.	Shrinkage.	Porosity.	Degree of Eosin Penetration.
Feb. 1910.				
1 Harvard	A	C	B	D
2 Harvard	A	B	B	D
3 Petroid N. P.	A	B	B	D
4 Fellowship N. P.	A	B	C	D
5 Fellowship N. P.	A	B	A	B
6 Fellowship	A	C	A	D
7 Fellowship	A	B	C	C
8 Ames' Cr. and Br.	A	B	A	A
9 Ames' Cr. and Br.	A	B	A	A
10 Ames' Cr. and Br.	A	A	A	A
11 Ames' Cr. and Br.	A	A	A	A
1911.				
12 Harvard	A	B	B	D
13 Harvard	A	B	B	D
14 Weston's	A	C	B	D
15 Weston's	A	C	B	D
16 Caulk's Petroid	A	C	B	D
17 Caulk's Petroid	A	B	B	D
18 Fellowship N. P.	A	A	B	A
19 Fellowship N. P.	A	B	B	B
20 Ames' Brown	A	B	A	A
21 Ames' Brown	A	B	A	A
22 Ames' Cr. and Br.	A	A	B	A
23 Ames' Cr. and Br.	A	A	B	A

A, Not sufficient to be seen with the unaided eye. B, Sufficient to be seen with the unaided eye. C, Quite marked. D, Eosin solution penetrated entirely through, and into the water below.

TESTS FOR CRUSHING STRENGTH AND ADHESION.

For the tests for crushing strength, fillings were made in the form of cubes of 1/10 of an inch. These were crushed in the dynamometer, and their strength in pounds was recorded. The average was taken from the four strongest fillings in each case.

Adhesion was tested by cementing a roughened metal surface of about 36 millimeters square to fresh bone, which was also roughened. These tests had to be made dry because, when the test pieces were placed in water, the metal soon dropped off. In a dry medium the adhesion decreased after from the first to the second day. The averages noted when the metal was pulled away from the bone are given in pounds in the table below:

	Crushing strength. lb.	Adhesion. lb.
Ames' D. Liquid	..	7½
Harvard	64	5½
Fellowship N. P.	65¾	5¼
Ames' C. Liquid	82	5
Petroid Improved	53¾	3¾
Ames' Oxyphos. Cop.	213	..
Caulk's Oxyphos. Cop.	81	..

SURGERY OF THE PULP, AND ITS RELATION TO PERIAPICAL INFECTION.

By N. C. LEONARD, D.D.S., Nashville, Tenn.

(Read before the National Dental Association, Southern Branch, at its fourteenth annual meeting, Atlanta, Ga., April 4, 1911.)

A CASUAL examination of current dental literature would indicate that there is still a very considerable proportion of practitioners, as well as teachers, who in a large percentage of cases demanding pulp removal adhere to the use of devitalizing agents. While it seems to be generally admitted that the surgical method is preferable in suitable cases, the selection seeming to fall usually on those cases that are easiest, we are left to infer that the old method is still held in high regard in the minds of the majority.

ATTITUDE OF THE PROFESSION TOWARD LOCAL ANESTHESIA AND EXTIRPATION OF THE PULP.

The attitude of the profession toward the newer method has not at any time since its introduction appeared to be so much one of skepticism and distrust, as one of timidity toward a method that is believed to make larger demands on the skill of the operator.

The surgical removal of the living pulp under local anesthesia, with proper aseptic precautions, followed by the introduction of a suitable root-canal filling, has been accepted without question as a scientific procedure. The difficulties and uncertainties attending this operation and its results are questions about which there still exist important differences of opinion. Certainly the subject is of sufficient importance to merit the best attention of the profession; and it is with the hope of eliminating some of the errors that have crept into the minds of the timid as to the difficulties involved in this method, of modifying the belief as to the uncertainties of result, and of establishing a better technique for this operation, that the writer feels justified in presenting this paper.

Extirpation of the pulp is certainly more in accord with modern surgical principles than the method requiring the use of devitalizing agents, and no part of medical science has a firmer foundation than these principles.

THE STAGES OF SURGICAL PULP EXTIRPATION.

The surgical method as generally employed may be, for convenience of discussion, divided into four stages, viz, cleansing and sterilizing the cavity, anesthetizing the pulp, removing the pulp, and filling the canal. It would now be easy to give classical advice covering these points: Thoroughly cleanse and sterilize the cavity and the point of exposure; anesthetize and remove carefully from each canal every vestige of the pulp to the apex of the root, making sure that no septic matter has been forced beyond; arrest hemorrhage if there be any, cauterizing the stump to prevent recurrence, flood the canals with a bland but efficient disinfectant; dry thoroughly and fill quickly and exactly to the apex with a non-irritating and permanently aseptic and antiseptic non-shrinkable and stable material. These directions, if it were possible to follow them in every case, would secure perfect results, but they are ideal, and probably not possible of accomplishment in a very large percentage of cases.

COMPLICATIONS.

The variableness of conditions under which we work, the temperament of the patient, and the varying anatomical arrangements and environment, must modify to a considerable degree the success of the most careful and painstaking effort to approach the ideal in each stage of the operation.

While we should keep in mind through the successive steps the ideal to which we would attain, using every available effort toward thoroughness, we should also be ready to recognize the limitations beyond which professional valor should yield to discretion, and make such compromise only as may be reasonably compensated by other details of the operation, or such as nature can be safely relied upon to correct.

STERILIZATION OF CAVITY AND PULP EXPOSURE.

To illustrate I may say in regard to the first stage of the operation that it is seldom possible, or to say the least, practicable, to perfectly sterilize the cavity and the point of exposure of the pulp; nor is it always possible to remove all the pulp tissue, whether septic or sterile. In these cases some compensating measure must be instituted to safeguard the periapical tissues, if possible, from septic invasion. In our ability to do this lies much of the future safety and utility of pulpless teeth. These compensating measures, of course, should always be secondary to thoroughness in each step, though, as a precaution, they should be an adjunct to every operation of extirpation.

The outline of technique that has proved satisfactory to the writer in its exclusive use for about fifteen years will serve to emphasize these points, and will also furnish a more definite basis for a profitable discussion.

After the cavity of exposure has been cleansed of débris, isolated, and dried, it should be flooded with a suitable disinfectant to sterilize the walls and exposed surface of the pulp. The cavity is again wiped out and dried, when it is ready for the application of the anesthetic.

PRESSURE ANESTHESIA.

In this next step the operator usually has opportunity to display considerable skill and dexterity. To produce anesthesia by pressure, the agent should be well confined directly against the pulp exposure. By the use of soft yellow wax, pressed into place with slightly moistened pellets of cotton held in the pliers, any cavity may be shaped to a form convenient for successfully applying this method of inducing anesthesia—barricading, for instance, the interdental space by building in the soft wax, and converting a difficult approximal cavity on the distal surface of a molar into a simple cone-shaped cavity with the pulp exposure at its apex; or, by applying to approximal cavities a metal matrix that has been covered with melted soft wax. As an anesthetic agent I use the cocain-adrenalin tablets or pellets put up by Parke, Davis & Co., about one-sixth of a grain of cocain to each tablet. By moistening a small pellet of cotton held in the pliers and touching it to the cocain and adrenalin, the anesthetic is easily conveyed to the cavity and placed in the form of a thick paste directly upon the exposure, allowing the cotton to remain to prevent displacement. A pellet of yellow wax—not soft vulcanite—is then placed in the cavity in such a way as to confine the semi-fluid cocain directly against the pulp, and at the same time to exclude air-bubbles that might displace the anesthetic. Then by slight pressure on the wax, either with the finger or with a pellet of cotton held in the pliers, the pulp is almost instantly anesthetized. If the cocain is allowed to remain in contact with the pulp for a few minutes before it is subjected to pressure, the anesthesia is usually accomplished without pain.

REFRACTORY AND PARTIALLY DEVITALIZED PULPS.

If the anesthesia is not complete in each branch of the pulp, it may be supplimented at any stage of the operation by additional applications in the same manner. I use this method in all cases demanding removal of vital pulps, from the third molar forward, and without regard to the location of the cavity. Pressure anesthesia can be successfully applied, in my opinion, in any cavity where devitalizing agents can be applied, and in some cases where it would be impracticable to use the latter. Partially devitalized pulps, in my own experience, have been the most difficult to anesthetize, though occasionally a pulp-stone will cause an obstinate complication, which may be a severe tax on the operator's patience and ingenuity. It is not infrequently necessary in cases of partially devitalized pulps, where the dead tissue acts as a valve, preventing the passage of the anesthetic, to work in the agent gradually with a nerve broach slipped between the pulp and the wall of the canal, until the living tissue is reached. The question of apical infection is one, of course, that must be kept in mind from the beginning to the end of the operation, and such prophylactic measures as are available should be employed.

Likelihood of periapical infection. Fortunately, as we are operating on an organ that is isolated and surrounded by dense bony walls and where the most powerful disinfectants can be freely applied to the entire field of operation, a reasonably careful technique is less hazardous than it would otherwise be. While the cavity at the beginning of the operation may be intensely septic, and the exposed pulp may be infected, the direct action of strong and penetrating disinfectants held for a few minutes in the cavity, and frequently applied during the operation, will compensate for a technique that might be much more careful and exacting in other directions. Theoretically, it would seem quite possible to force, with the anesthetic, septic material from an ulcer in the pulp beyond the end of the root into the periapical tissues, and yet my own clinical experience would indicate that with a reasonably careful technique, this is a very remote possibility. If the pulp tissue is immediately removed and the canals are flooded at the same time with an efficient disinfectant, it is reasonable to suppose that any septic matter that may have found its way into the canals will be rendered innocuous.

EXTIRPATION OF THE PULP.

After the pulp has been anesthetized, the cavity is again flooded with the antiseptic, and with a sterile bur the pulp chamber is drilled out and enlarged, so that free entrance may be had to the root-canals.

For removing the pulp from the roots, barbed broaches, one of suitable size for each canal, should be selected and adjusted to as many holders, taking care to sterilize them thoroughly. A broach is then introduced into its respective canal and deftly worked to the apex, which can usually be determined through a delicate sense of touch by a suddenly increased resistance; then, while the handle of the broach is being held in position with one hand, a drop of the fluid disinfectant with which the canal is to be flooded is placed with the pliers against the broach where it enters the canal. The broach is then to be slightly rotated to break loose the pulp at the apex, and as it is slowly withdrawn, the antiseptic agent, which has already been partially carried in by capillary attraction, is forced by air-pressure to fill the vacuum created by the removal of the broach and pulp tissue. This is perhaps the surest way of flooding the canals with the antiseptic, as it practically prevents the invasion of air-bubbles that would interfere with the flooding subsequently.

In broad flat canals two broaches may often be used to advantage at the same time in removing the pulp tissue. We find teeth, of course, with such constricted canals that it is practically impossible to remove from them all of the contents. But the difficulty in these cases would not be obviated by the use of devitalizing agents; and in my opinion it is safer to leave these filaments in a sterile condition and risk their gradual degeneration than to leave them in what we know to be a septic condition. Nature is wonderfully resourceful in taking care of impaired tissue that has not been subjected to outward septic influence.

IMMEDIATE ROOT-CANAL FILLING.

Having had no reason for changing my views, and desiring particularly to emphasize the same points, I may be pardoned for quoting freely from my own essay on the same subject read before the National Dental Association five years ago in this city:*

> When the pulp has been removed, my invariable rule is immediate filling of the canals, and this I consider the greatest safeguard against periapical infection. If all reasonable aseptic precautions have been observed in removing the pulp, I cannot believe that there could be a more favorable time for filling the canals than immediately after the extirpation, while we have the greatest possible assurance that they are sterile. To delay this part of the operation for a subsequent sitting would be but to double or treble the chances of infection without offering any compensating advantage, and would deprive us of the use of the best means at our disposal to combat and render innocuous any septic or infectious material that may have been introduced into the canals during the operation.
>
> Certainly no progressive surgeon, after performing an aseptic operation for appendicitis, could be excused for leaving the wound open for subsequent examination to see if everything is all right. He removes the appendix, ligates the stump, manipulates the tissues as little as possible, and closes the wound permanently with an aseptic dressing, which he does not expect to remove till the wound has healed.
>
> The proper filling of the root-canals after the extirpation of the pulp is simply the application of a suitable and permanent surgical dressing for the protection of the living tissue at the end of the root, and is efficient in proportion as the filling is aseptic, antiseptic, non-irritating, and stable.
>
> As a result of extirpation of the pulp there is often considerable and persistent hemorrhage, and the presence of this condition is urged by our authorities as a positive indication against immediate root-filling. To me, their reasoning appears illogical. The very best device possible for controlling hemorrhage is mechanical means, and I can see no reasonable objection to the immediate introduction of a permanent root-filling for this purpose, if the hemorrhage is persistent. Assuming that the operation so far has been done with due regard to cleanliness and asepsis, there should be nothing to fear if we stop the flow of blood with an antiseptic and non-irritating dressing placed in contact with the bleeding stump.
>
> The blood itself is sterile, and if we observe the same precautions in the preparation and introduction of the filling materials as were observed during the extirpation of the organ, there could certainly be no more reason to fear infection than if the hemorrhage had not occurred. If there be danger from a clot in the apical region, then there would be less danger with the root filled, for the reasons that there would be less space for a clot, and the chief avenue of infection would be shut off by the filling.
>
> I cannot conceive of a surgical operation of any kind being completed without leaving a certain amount of free blood to coagulate in the wound; but in the case just mentioned the amount of free blood left would be inconsiderable and insignificant as compared with that left by the most careful operator

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* See DENTAL COSMOS, May 1907, p. 505: "'Pressure Anesthesia' and the Removal of Living Pulps."

in an abdominal section, where the wound is immediately closed and permanently sealed with the assurance—in non-septic cases—that if no infectious material has been introduced by the operator, the free blood will not affect his results.

If persistent hemorrhage through the canal after extirpation should deter the operator from immediate filling, the clot that would surely be present at a subsequent sitting would be a much more serious menace to a successful result, in my opinion, than the presence of hemorrhage in the first instance. With the root-canals properly filled, the chances of secondary hemorrhage, against which we have been repeatedly warned, does not seem to me to deserve serious consideration.

As a root-filling material for this class of cases, that which I have adopted—and which seems to meet the requirements—is a paste made by mixing two parts of a coarse cement powder and one part of aristol with oil of cinnamon or any other essential oil or antiseptic agent. This can be introduced with smooth broaches into the bleeding canal, thus partially filling it. Then, with pellets of cotton in the pliers, the paste may be forced into the canal, and packed as hard as may be desired. The cotton pellets, besides forcing the paste into the canals, absorb the blood and excess of fluid from the paste.

If there be any reason to believe that any considerable quantity of free blood has been confined in the apical region beyond the paste, it may be allowed to escape by passing a small, smooth broach through the paste to the end of the canal, subsequently closing the opening with a sterilized gutta-percha canal point. I use this paste as a permanent dressing in all canals where I have practiced extirpation, generally supplementing it with a gutta-percha point, and packing the paste with cotton pellets, using always considerable force to make it dense, and at the same time to force it into all irregularities of the canal.

I do not urge this as the only or the best method of filling root-canals in this class of cases. As it has proved itself satisfactory in my hands and as it seems to be non-irritating, permanently antiseptic, and is easily adapted to all cases, it may appeal to others.

Admitting that there are many cases in which all the pulp tissue cannot be removed from the most restricted portions of the canals, I wish again to urge that the most rational treatment for these cases is the surgical method that has been described, supplemented by immediate root-filling. The aid of nature's degenerative processes in so small a filament of sterile living tissue the nutrition of which has been seriously interfered with, could be more logically expected than the tolerance of the sensitive periapical membrane in contact with devitalized tissue which is subject to the usual putrefactive changes and which has been charged with a chemical poison.

Clinical experience bears out this conclusion, and while I do not wish to minimize the importance of thoroughness in pulp removal, I hope to encourage a more scientific means of compensating for our imperfect technique.

Nature surely is better able to take care of a reasonable amount of sterile waste products than we are able to prevent putrefactive and bacteriological changes in inaccessible dead tissue by infiltration of disinfectants.

SURGICAL PULP REMOVAL IN CHILDREN'S PERMANENT AND DECIDUOUS TEETH.

There are two classes of cases to which I desire to call particular attention in urging the selection of the surgical method of pulp removal:

The first comprises the incompletely formed permanent teeth of children in which the roots are not fully grown. In these the canals are large, and the apical ends of the roots often funnel-shaped. This class of cases is generally regarded as unfavorable for pulp removal, and, in my opinion, is subject to particularly disastrous results following the use of devitalizing agents. In my own experience these cases have proved to be most suitable for extirpation and immediate root-filling, by which methods these teeth have been made quite as comfortable and useful as those with fully developed roots, and I can see no good reason for believing that they will not permanently remain so.

In removing the pulps from the canals of these teeth, large-sized, well-barbed broaches should be used. The canals are often of almost uniform size throughout their entire length, and care should be used not to pass the instrument beyond the apical end. By rotating the broach about one-half or two-thirds around in order to engage the barbs in the pulp tissue, the pulp can usually be removed as a whole.

There is often profuse hemorrhage, which may be controlled by dressing and filling canals as suggested above. The first permanent molars are most frequently the subjects of early and disastrous caries, so insidious that the pulp is often exposed before the parents realize that these teeth are permanent. No teeth that we are called upon to treat are of greater importance and call more imperatively for preservation.

The second class for which I wish to urge the use of this method as being the truly scientific one comprises the deciduous teeth, in which the most satisfactory results may be obtained.

CONCLUSION.

In closing I should like to express the belief that teeth from which the vital pulps have been removed by extirpation, and in which the canals have been aseptically filled, will have a much longer life than those in which devitalizing agents have been used. I should also like to state that I have never had in my practice one single case of swollen face due to infection following the use of this method.

THE DENTIST'S ATTITUDE TOWARD PROFESSIONAL LITERATURE.

By ADOLPHE S. VAN TESLAAR, D.D.S., Chicago, Ill.

IN its immediate bearings upon the health and general welfare of our citizens, dentistry is conceived by the latter to be a mechanical art, chiefly because heretofore the relations of the profession to the public have been such that the need of skill or manual dexterity was most evident, while learning and general scientific training were less conspicuous. In some communities dentists are still looked upon as devoted simply to a handicraft; such communities ignore the newer advances which require that the dentist be familiar with the principles of anatomy, physiology, pathology, bacteriology, chemistry, pharmacology, surgery, and other sciences, as much as with the tools of his vocation.

THE SCIENTIFIC EVOLUTION OF DENTISTRY.

Dentistry is not slighted in the least when referred to as an art. Indeed, it is to its credit rather than otherwise that dentistry began as an art before the sciences that form its foundation today were formulated. All art beginnings precede science, and in this respect dentistry is no exception. But, like all modern art, the practice of dentistry today is rooted deeply in various branches of learning. The physical as well as the biological sciences form the basis of dentistry, because it deals with a portion of the body which, like the organism as a whole, is subject to both physico-mechanical and biotic laws. While the fundamental principles of these sciences may be said to remain fairly constant for practical purposes, there are many discoveries within each field of science and numerous innovations the application of which to the field of dental art renders the practice of dentistry an actively shifting field in which changes and improvements are the order of the day.

PARALLELISM BETWEEN DENTISTRY AND OTHER SCIENCES.

There is a strong and most intimate parallelism between the practical side of dentistry and the physical, chemical, and biological sciences that form its background. Since the beginning of the modern era, science and art, theory and practice, have never been apart in dentistry, but today they are knit together more closely than ever. Dentistry is an organic unity formed by the junction of art and science, knowledge and skill. We may conceive this union to be as intimate as that of body and soul; the two are one.

It follows that as thought and action are in close correspondence, so every advance in any of the sciences that form its background is bound to reflect at once upon the field of practical achievement in dentistry. Mysterious rays, unknown before, are discovered by a physicist whose thoughts perchance may be farthest from dentistry, and forthwith the diagnosis of many obscure ailments centering around the teeth and jawbones is made easy. A practical miner or a metallurgist discovers a new mineral, a chemist discovers a new compound, and dentistry is placed thereby on a higher plane of efficiency at once. One dentist, after numerous experiments and trials, introduces into the field the process of casting metal, and our whole practice is revolutionized thereby. It is to this vital relation between dentistry and practically every experimental science that we must ascribe the notable advance of our profession in recent years. Dentistry today represents the application of new knowledge to an old art. With the growth of the sciences, our practice shifts and moves forward.

ADVANCE OF DENTISTRY REFLECTED IN THE CURRENT DENTAL LITERATURE.

There is only one way in which we may keep in touch constantly with the advance of our profession. The current dental periodicals offer us this opportunity. In the pages of the periodicals, in the transactions and reports of the meetings of dental societies, national, state, and local, we may find recorded from year to year, and from month to month, the latest suggestions and improvements. I look upon the periodical literature of dentistry as a serial story, the ever-unfolding record of dental achievement. Each instalment, whether it be a copy of a journal, a book, a pamphlet, a report, or what not, adds its "incidents" to the main trend of things.

What a benefit and a privilege our professional literature is to each of us individually we hardly ever stop to consider, as we take all the comforts and blessings of civilization as a matter of course. Through the medium of our literature we are privileged to meet, learn from, and profit by the experience of every gifted member of our profession.

PRACTICAL VALUE OF PERIODICAL DENTAL LITERATURE.

It is one of the most gratifying signs, speaking well for the future of our profession, that the stream of dental journalism has increased in volume very rapidly with the advance in science; but even more gratifying is the fact that it has improved in quality. To be sure, we hear a great deal of criticism about our literature, and much of this criticism is justified in spirit and commendable in intent, however harsh sometimes may be the form under which it greets our eyes. Those who bewail the fact that our dental literature and our schools are not what they ought to be should also note that but a short generation ago our literature and our dental education were not nearly as efficient as they are today; and though much more remains to be done, let the recent past serve to show that influences are at work within our profession which make for improvement in every direction. The improvement along some lines may not be as rapid as the more sanguine among us may wish, but this is a phase of the subject which need not be considered in this connection. For the present we may note briefly that the dentist who takes the time to read his journals is better repaid for his trouble than ever before. Time- and labor-saving devices abound everywhere; useful hints and suggestions pregnant with good are prepared for us by a thousand willing minds and brought right into our office and home through the medium of our periodicals, so that the dentist who reads the current professional literature has an excellent opportunity to add to his knowledge and improve his skill.

THE DENTAL PRACTITIONER'S EFFICIENCY MAINTAINED AND RAISED BY READING CURRENT LITERATURE.

What is the most obvious inference from this situation? What, if not this: Other things being equal, the best informed and most up-to-date dentist in any community is he who does not neglect the literature of his profession.

The possession of a college diploma and of a license to practice is a test. Some dentists, especially among the young, having gone through the period of apprenticeship at college, fancy that being duly licensed and possessing the right to affix a title in front of their names, or tailward, the world now owes them a living. The world owes one nothing that he is not competent to obtain. The degree and the license we possess are an advantage which society expects us to utilize in a proper manner. Through them society tells us, in effect: "You are the chosen ones to do this work; we will not allow others to do it; now prove your mettle! And it is for us to prove that we do not mean to play truant, that we are in earnest, that on such advantageous terms we cannot but accept the challenge to do our part.

Of the dentist who neglects to read and study after graduation it can hardly be said that he does his duty. The profession moves forward; we must move with it. The dentist who is satisfied with what knowledge he may have acquired at the college may soon find himself dissatisfied with his neighbors, his practice, or with the community in which he lives.

There are also those among us who find fault with the professional outlook a few years after graduation and complain that they must turn to other vocations. Think of it! While the city of Chicago alone needs for its school children, if their teeth are to be properly looked after, more dentists than there are in the whole state of Illinois, and a similar condition prevails in every other center of population in this country, there are young dentists dropping out of the profession because they believe it offers them no opportunities. A mixture of attenuated patience and heightened efficiency should prove effective in many such cases of discouragement.

Speaking of efficiency, let us note that it must be broadened as much as it needs deepening. Whatever we do, by practice we learn to do better. But there are also many new things we must learn to do, if we are not to lag behind our times. Besides keeping our knowledge, skill, and efficiency up to a certain level by practice and reading, we must seek to raise our own level and that of the whole profession higher and higher along all modern lines.

The innovations in dentistry and their practical bearing upon many of the conditions for which patients consult us daily are so important that we must know them and apply them wherever necessary, if our patients are to receive the benefit of the best advice and of the latest and most advanced forms of care required by their respective conditions.

It is strange, therefore, that for every dentist who subscribes for and reads dental periodicals, there are at least two who do not. About two-thirds of the membership of our profession cannot be reached by means of periodicals published solely in the interests of dentistry.

THE DENTIST'S MORAL OBLIGATIONS TOWARD HIS PROFESSION AND HIS PATIENTS AS RELATED TO READING.

Another query, too, suggests itself as we consider these matters: What is the outlook of those who do not read the literature of their vocation? What do the dentists who neither attend meetings nor read journals, think of that vocation? They must view their profession primarily as one would a trade—must see in it only a means of earning their living and nothing more; further than that they are probably not interested in dentistry. No doubt they also imagine that, as they are perhaps doing their best for their patients while at work in the office, it is not their patients' concern how they choose to spend their spare time.

But the consciousness of having done one's best professionally should be associated with the conviction that we possess proper skill and knowledge. The feeling that our best is not materially below the profession's average, to say the least, is imperative for comfort and peace of mind—for real success; it is the safest assurance we can have that we shall hold our own in the struggle for existence. Many give up work who cannot afford, perhaps because they do not deserve, the soothing and tonic effect of such a feeling. They are getting behind in the struggle, and become inclined to believe that something is wrong with the world to which they so ill-adapt themselves. They would make a change, shifting the wheel, turning the world around its circumference, instead of effecting the same result by the obviously simpler task of turning the center—instead of changing themselves, by dealing vigorously with their own faults and petty shortcomings.

Indeed, viewing the subject broadly, the best we can do should not be synonymous with the knowledge acquired at college, supplemented merely by our individual experience. It is the modern dentist's duty to profit by and give his patients the benefit of the profession's latest correlated and counterchecked experience as expressed at meetings, national, state, and local, occasional alumni clinics, international congresses, and through the journals. Although no dentist can attend all the meetings where he might gather useful information, he can at least read about the doings of every society in his journals, and he may thus study at home. I say "study" advisedly; there is too much reading and too little studying everywhere, and we dentists share in this fault with the rest of the people.

In a strictly legal sense the dentist acquits himself of his professional duty honorably enough who does for his patients the best according to his knowledge and ability. But our notion of social responsibility has outgrown the limits of legal accountability. It is a most significant fact of our moral life today that we no longer consider righteous a man whose only claim to this designation is the fact that he has not been declared legally guilty of unsocial practices. Our ethical standard today is higher than the moral plane contemplated by the letter of the law. We look more and more for the living up to the higher unwritten moral law. This makes it incumbent upon us not only to do our best, but also to see to it that at no time shall "our best" be materially below our neighbor's; indeed, we must strive to know as much and be as skilful as our neighbor, lest we be tempted to seek unfair means whereby to strike a balance in our favor before the public eye.

Beyond cavil our patients are entitled to the best services which the profession, calculated at a fair average, is capable of rendering. The important point is: This average, no matter how computed, must take into account at least some of the most striking advances that have been made since our college days. Therefore, in all fairness, and whenever anything seems to be going wrong, let us ask ourselves, Do we give our patients such service when they trust their teeth to our care? Or are we running behind in our obligations to them? This is as vital to our patients' interest as their obligations are to us, and often we are arbiters and judges for both sides. The dentist who does not enjoy his heart's approval whenever it becomes necessary for him to settle his own doubts on this delicate point—and no one can who does not give his patients the benefit of the latest achievements of his art—is introducing into his life habits of carelessness that may end in serious moral turpitude. Besides depriving his patients of their due—practically withholding from them something to which they are justly entitled—such a dentist is robbing himself of the satisfaction of a well-ordered life.

To know oneself prepared to give patients the best service begets courage and confidence. The dentist who does less, and substitutes for modern improvements the old and outgrown practices is guilty, in a certain sense, of a betrayal of trust. It may be less costly to the patient and less troublesome to have a tooth extracted; but the dentist who seeks refuge in such excuses and does not rescue every tooth that may be saved is not doing his professional duty. The dentist who does not know how to do this in every case where it can be done, who does not know a hundred other things that the profession has learned to do since his college days, has but a weak claim to the community's attention and good-will. What important innovation a dentist has not learned at college it is his duty to learn afterward.

THE INSPIRATION OF READING.

All this has a direct bearing upon the dentist's evident duty to keep in close touch with dental literature. Once the habit of reading is well established, considerable pleasure is derived through it, as well as profit. There is nothing like judicious reading to refresh one's interest in professional work and enable one to avoid the feeling of drudgery. By reading of the commonplaces of daily experience and about the innovations in dentistry our sense of worth in our work is constantly renewed and kept fresh. The busier the dentist, the greater his duty to read—because, both for his own sake and that of the community which he serves, the busiest dentist is the very one who can least afford to short-circuit himself from the refreshing inspiration and breadth of vision one gains through reading.

THE CARE OF THE MOUTHS AND TEETH OF LITTLE CHILDREN.

By H. B. TILESTON, M.D., D.D.S., Louisville, Ky.

(Read before the Southern Branch of the National Dental Association at Atlanta, Ga., April 4, 1911.)

MUCH has been said and written concerning the care of the permanent teeth, and recently the dental press has teemed with articles on oral hygiene, until the reader almost grows weary of a very good thing.

CARE OF TOOTH DEVELOPMENT IN THE UNBORN CHILD.

Not overmuch has been said lately, however, about the care of the mouth and teeth of little children; by that I mean very little children, in whose mouths are only deciduous teeth, or in whom no teeth have as yet made their appearance. I even have in mind, and purpose to speak of the care *for* rather than *of* the teeth, of children unborn.

If it may truthfully be said, as someone has suggested, that the education of a child should begin with its grandmother, it is certainly no less true, and far more easily demonstrated, that a prudent care for a child's teeth should begin with its mother, and some time previous to its birth.

When it is remembered that the calcification of the teeth of the primary dentition begins at the seventeenth or eighteenth week in the embryo, and that, at birth, the crowns, *i.e.* that portion of the teeth which will later be subject to the attacks of caries, are practically completed, it will be readily appreciated that it is quite possible for certain influences to make or mar the perfection of the deciduous teeth during the period of gestation. They may be atrophied in their development, particularly the enamel, by a syphilitic taint in either parent, by tuberculosis of the mother, or by an attack of some exanthematous disease during the period of activity of the ameloblasts, or by any illness tending to interrupt the growth of enamel, and by insufficient or improper diet during that time.

CONCERNING DIET DURING PREGNANCY.

The question of diet is the most important one to consider in this connection, because it is potentially within the control of the prospective mother. In some instances a diet not calculated to supply the needs of a growing tooth is indulged in through ignorance, or possibly from necessity, but it is also undoubtedly true that in many cases the dietary is intentionally perverted under the impression, probably largely based upon superstition—though quite likely not altogether so—that, in order to escape difficult and painful parturition, all bone-forming foods must be avoided. Thus it happens that many pregnant women refrain from eating bread and cereals, such foods as would supply the phosphates necessary to the growth of the bones and of the teeth of the developing fetus.

After the child is born the bones may recover from such impoverishment through the nutrient channels of the babe itself, but at birth the enamel of the deciduous teeth, with the exception of about the gingival third of the second molars, is finished, and the ameloblasts having disappeared, there is no possible chance for any imperfections of development then existing to be remedied.

When these teeth finally make their appearance, inadequately protected by the failure of the calcification centers of the enamel caps to coalesce in the sulci of the molars and at points upon the incisors and canines, it is not surprising that they fall early victims to the ravages of caries.

If this condition is properly referable to incorrect feeding on the part of the mother, it would seem the part of wisdom, in the interest of the future usefulness of the teeth of the infant and their conservation, that some educational work should be undertaken by both the family dentist and the physician to teach mothers what they should eat during the period of gestation in order to supply the essential elements of the developing teeth. Not that they should be encouraged to partake of an undue amount of bone-forming ingesta with the ambition to produce superlative teeth, but that the regimen might be normal as nearly as possible, without thought either of depriving the fetus of calcium phosphate and carbonate or of giving it an excessive supply of these salts.

ADMINISTRATION OF MILK OF MAGNESIA INJURIOUS.

Another possible cause of imperfect calcification of the teeth, both of the deciduous and permanent set, is suggested by a recent publication from the pen of Dr. John Aulde, a physician of Philadelphia, Pa., in which he claims to have observed, in the administration of large and frequent doses of the milk of magnesia, that the magnesium will substitute itself for the calcium in the bones.

This element is prescribed freely by physicians as a corrective in cases of acid excreta by the kidneys, the skin, and the bowels, or for acid vomiting, and is used *ad libitum* as a home remedy for sour stomach and as an aperient. Dr. Philip F. Barbour of Louisville, an eminent specialist in children's diseases, called my attention to it, and suggested that such substitution might have some effect upon the teeth. He said he had frequently administered it to children and to pregnant women in conditions which he termed "acid storms," when all the excretions were for a time acid, and that since reading Dr. Aulde's article he had made observations which appeared to verify the claims he advanced.

The chalky white atrophic spot so often seen in the enamel of both the deciduous and permanent teeth and the areas devoid of enamel might be accounted for quite reasonably in this manner. If Dr. Aulde's claims are substantiated by further observation, greater circumspection in the use of this apparently harmless substance will be called for.

DIET AND CARE AFTER BIRTH OF THE CHILD.

The moment the child is born it becomes an independent entity as far as its nutrient economy is concerned, and its diet must be looked after either through the food of the mother, if she nurses the child, or by the careful selection of food given directly to it. But then the concern is no longer for the deciduous teeth, but for the permanent ones, which have already begun to calcify, and in which enamel formation will continue for eight years. It is during this period that eruptive diseases are apt to leave their mark upon the enamel, and every dentist has observed the effects of measles or scarlet fever in the markings left upon that tissue.

The teeth have generally been classed as dermal tissues, as distinguished from the osseous, but the enamel, which is developed from the epithelial layer of the blastoderm, is the only part of the tooth which may properly be looked upon as being an appendage of the skin, and it is that portion which is affected by skin diseases when they occur during the period of amelification. It is during this period, also, that the effects upon the enamel might be expected to occur from the administration of magnesia referred to above.

LANCING OF THE GUMS.

The operation of lancing the gums in cases of morbid primary dentition was formerly much more generally practiced than it is now. At one time almost every systemic disturbance occurring in the infant between the ages of six months and two years was conveniently attributed by medical practitioners to the process of "teething," and gum lancing as a remedy was indiscriminately resorted to both by physicians and dental specialists.

With the acquirement of more thorough and complete knowledge of infant pathology the pendulum has swung to the other extreme, and at the present time most physicians attach very small importance to difficult dentition as a factor in infantile pathemata. As a consequence, gum-lancing is just now quite out of fashion. Nevertheless, conditions frequently present in cases of retarded eruption of the deciduous teeth which seem to render this operation imperative, and gum-lancing therefore, ought not to be relegated to the obsolete.

An intelligent appreciation of the conditions as they exist about an erupting tooth within the jaw, the overlying elastic gum tissue forcing the tooth with its circular knife-like incomplete root back upon the highly vascular tissues about its apex, together with the inflamed and sensitive state of the gum itself, suggests at once the use of the lancet to release the imprisoned tooth. The complete relaxation which follows, an infant on the verge of convulsions falling into a peaceful sleep or comfortably resuming its play, affords ample justification for the operation.

CARE OF THE TEETH AFTER ERUPTION. UNTOWARD EFFECTS OF SUGAR AND STARCH.

When the teeth finally make their appearance, then not only the diet of the child but its habits of mastication and oral hygiene are to be regulated, looking not so much to the development, at least of the deciduous teeth, as to their preservation and proper function.

The question of diet is to be considered in its relations to both tooth development and preservation of the teeth. The milk from a well-nourished mother is conceded to be the food best adapted to supply all the needs of a growing infant. While artificial foods may be sufficiently nourishing, they are almost invariably so excessively charged with sugar that the teeth, after their eruption, if such foods are continued, are sure to suffer, unless extraordinary precautions as to oral prophylaxis are employed.

Dr. M. Evangeline Jordon of Los

Angeles, Cal., in a paper read at the meeting of the National Dental Association in Denver, calls attention to the injury almost invariably inflicted upon the teeth of little children by the use of condensed milk, and cites several cases from practice showing excessive damage from this cause.

The use of sweetened infant foods cultivates a taste for sweets, and the child, as it grows older, develops the proverbial "sugar tooth," a craving for candies and cakes, for syrups and dainty tidbits that exclude from the diet the more nourishing foods, much to the injury of general health and the teeth.

Foods containing sugar are not necessarily destructive to the teeth. It is only when the sugar is allowed to remain upon and between them until changed by the bacteria thriving upon it into lactic acid, that the teeth suffer from caries. Foods containing starch, which is changed to grape sugar, a glucose, in the mouth, are just as bad for the teeth, and farinaceous substances are necessarily a part of every mixed dietary. Sugar in the form of confections is worse only because it is eaten at all times, with meals and between them. No direct harm would be done to the teeth in any case if the mouth could be thoroughly cleansed of all traces of sugar or starch immediately after partaking of them; a difficult thing to do when the habit of eating candy is indulged in continuously. For this reason children should be denied the use of candy at all times, and be permitted only a limited quantity of sweets with meals, after which the teeth should be cleansed by the mother or nurse, and, as soon as feasible, by the child itself.

The eruption of the very first deciduous tooth proclaims the time for the beginning of prophylaxis. The prudent mother will care for that little tooth, and clean it and polish it like the precious jewel that it is, and, as others appear, the field of operation will widen until it includes the entire galaxy of gems. A child is as susceptible to the delicious sensation of oral cleanliness as older people are, and if the teeth are kept clean during the time when that duty must be performed by the mother, the work will be continued by the child as soon as it is old enough, and the habit thus begun will continue throughout life. Given a set of teeth free from congenital imperfections, such care as this will certainly preserve them until they are exfoliated to make room for their successors.

Recently I had the pleasure of viewing in the mouth of a little boy four years old a set of teeth so beautiful and perfect that I took impressions of them and made these casts [demonstrating]. Every tooth in both dentures is absolutely free from spot or blemish of any kind. This child has never tasted candy, and his mother and his aunt began cleaning and polishing his teeth as soon as the first incisor appeared, with this most gratifying result.

But alas, few mothers have either the inclination or the slightest conception of its importance to impel them to perform such service for their little ones, and as a consequence the first view that the dentist has of the majority of the mouths of little children brought to him, usually for the relief of pain, is not only discouraging but disgusting. In a large proportion of instances the parents have never dreamed of such a thing as cleaning their child's teeth.

Most parents, some dentists, and many physicians look upon any special care of or solicitude for deciduous teeth as all but useless, since, in their opinion, they are to last but a little while anyhow. There is a widespread and utter lack of appreciation of the purposes of the primary set of teeth or of the beautiful arrangement in nature whereby the growing child is provided with a continuous masticating apparatus. Since the teeth themselves cannot increase in size to keep pace with the growing maxillæ, a small set is gradually superseded by a larger and stronger one suited to the larger and stronger jaws, and the deciduous teeth are intended to perform all the functions of their permanent successors until displaced by the latter. If the deciduous teeth are preserved in all their integrity, this process of replacement goes on smoothly; but if any are prematurely lost or their approximal contact is destroyed by caries, or if abscesses are allowed to form from putrescent pulps, then all goes wrong.

THE DENTIST'S PROBLEM.

Fully cognizant of the crying need for operative services in the mouths of little children who are entrusted to his care, and as fully aware also of the difficulties attending such service, sometimes almost or quite insurmountable, the dentist is confronted with a serious problem, and he asks himself the question What shall I do about it? If he fails to direct the attention of the parents to a need he knows to exist in their child's mouth, he shirks a known duty; and if he makes a conscientious effort to impress the parents with the importance of caring for such conditions he knows he will be called upon to do it, and in many instances he would prefer not to undertake it. Children who have been spoiled at home or have been taught to look upon a visit to the dentist as a fearful thing are usually hopeless as patients, and after having spent a fruitless hour with such a child, the dentist may be pardoned if he fervently hopes never to see that youngster again, and feels that he must hie himself away with his golf clubs and have a foursome or a lonesome, and forget his troubles.

Fortunately such extreme cases are comparatively rare, and will become less frequent as the parents, through the advice and instruction of the family dentist, train their children to value their teeth, and to look upon the dentist as a friend and not a monster to be dreaded. The solution of the problem lies in getting hold of the little ones so early that there is nothing to be done that will cause pain, and then so guarding their development, by frequent visits to the office, together with proper care at home, that no occasion will ever arise for the infliction of any great amount of pain.

While some cases in every practice may be treated in this manner, and while their number may be confidently expected to increase, there still occur numerous cases where the destruction of the teeth has progressed to a point which all but prohibits any hope of success in the attempt to save them. The complaint is made that the fees obtainable for such service are not commensurate with the time and skill required, not to mention the wear and tear on the nerves and the patience of the operator.

The question which presents itself frequently in a practice among a good class of people, such as most ethical dentists enjoy, is not, What shall I do for poor children's teeth? but, What shall I do for the teeth of children whose parents are willing and anxious to have done whatever I advise, and who are able to pay for it? When it is explained to such parents that the contemplated service, together with the time and skill required to perform it, is worth more to the future of the child than the same amount of care devoted to it later in life will be, they will usually be perfectly willing to pay a satisfactory fee. It is then "up to the dentist," and quite often the *what* and the *how* constitute another difficult problem. The conscientious practitioner will want to do many things that he cannot do, and will have to be content to do the best he can under the circumstances, realizing that frequently that best is a very poor thing indeed.

AMUSING CHILDREN.

Many suggestions have been made and devices offered for the amusement of children in the dental chair. In children who are shy and timid some means must be adopted to reassure them and gain their confidence before anything can be accomplished, but in my opinion the efforts to amuse them may easily be carried too far, especially with forward, wilful children who are quite willing to be amused, but are for all that no more ready to submit to the real object of their visit than before; in fact, they rather prefer that the dentist should continue to amuse them.

Objection has been made to the paraphernalia surrounding the modern dental chair as calculated to inspire fear and dread in a child. Intelligent children are usually of an inquiring turn of mind, and a tactful dentist can readily interest them in his various appliances, and in order to illustrate their use will presently be actually using them on the little patient. I think more can be accomplished with little children by a kind, gentle and sympathetic attitude, together with enough firmness and not-too-severe dignity to command their respect, than by any effort to amuse them which may encourage familiarity to the extent of breeding contempt for the real purpose of their visit as well as for the dentist.

THE USE OF ARSENOUS OXID IN DECIDUOUS TEETH.

It was my original purpose in presenting this paper to devote it largely to the consideration of operative procedures on deciduous teeth, but the topics discussed so far have extended this essay to such a length that I will not attempt, at this time, to take up the details of practice in the treatment of the various conditions met with in the mouths of little children.

There is one topic, however, I would speak of in this connection, namely, the use of arsenic in the deciduous teeth. Dr. Jordon, in the paper mentioned above, advocates the use of arsenous oxid for devitalizing exposed pulps in deciduous teeth, and reports very favorable results following such practice. In the course of the discussion of her paper considerable opposition to such use of arsenic was manifest.

Arsenic is a drug which seems to have a peculiar selective effect upon the dental pulp, and a quantity so minute as to be almost inappreciable is sufficient to destroy the vitality of even an adult tooth pulp. When used with discretion, I see no reason why it should not be safely employed in little children's teeth. The danger lies in applying too large an amount of the drug, or in leaving it in contact with the pulp too long; hence, if it is used in deciduous teeth at all, it must be applied with extreme care and with the assurance that the child will be seen again within twenty-four hours.

NEGLECT OF THE DECIDUOUS TEETH DUE TO IGNORANCE.

If parents, though educated and cultured, have been indifferent to the care of the mouths and teeth of their little ones, if they have neglected to consult the dentist until the deciduous teeth have become almost hopelessly involved, and the child is suffering pain that might have been avoided; if they have failed to appreciate the value of sound teeth for the general welfare of their child, and if they do not realize that any effort and expense necessary to save the deciduous teeth is worth while, it is all due to ignorance.

But all this is to be changed. The educational propaganda on the subject of oral hygiene which is sweeping the civilized world is surely destined to bring about a new order of things, and if every dentist faithfully and earnestly does his part, if he is not recreant to his most sacred professional obligation to patiently instruct all who come under his care, both the old and the young, in the care of these priceless organs, which are designed for a certain useful purpose and are intended to endure and not to be prematurely crippled or lost, then soon ignorance will be no more, human life will be made happier, healthier, and longer, and all mankind will rise up and call the dentist blessed.

CAST GOLD INLAYS.

By **THOS. P. HINMAN, D.D.S., Atlanta, Ga.,**
PROFESSOR OF OPERATIVE DENTISTRY AND ORAL SURGERY, ATLANTA DENTAL COLLEGE.

(Read before the National Dental Association, Southern Branch, at Atlanta, Ga., April 4, 1911.)

FILLING the teeth with inlays made of gold or other materials is not so modern a form of practice as some people might think, but the perfection of this system in the last eight or ten years, which is due to the untiring efforts of Ames, Alexander, Taggart, and many other eminent investigators, has raised it to its present deserved prominence.

My purpose in presenting this paper is to explain, if possible, some of the difficulties that manifest themselves during the process of filling teeth with some form of cast gold. For convenience I will make the following divisions: (1) Cavity preparation. (2) Making of the wax form. (3) Investing. (4) Casting and preparation of the inlay for cementation.

CAVITY PREPARATION.

I will lay down the following rules for cavity preparation: Remove all angles from the inside of the cavity, and have the walls so formed that the matrix may be removed without difficulty or distortion. The main rule that I wish to lay down is that the cavity should be so formed that when the inlay is placed in its position without cement, it cannot be dislodged by the forces of mastication. To elucidate somewhat, I will say that cavities in bicuspids and molars, for the reception of inlays, should always have a dovetail anchorage in their coronal portion deep enough to retain the inlay without cement. If the cement is depended upon entirely to hold inlays of this description, ultimate failure will be the most certain result, and yet we constantly see cavities so prepared. If the cavity extends below the gum line, the gum should be forced away by some process of wedging, such as gutta-percha packed between the teeth for several days or by the use of cotton and sandarac. When the cavity has been thus prepared, it should be carefully washed of all débris.

MAKING THE WAX FORM.

The wax should possess a minimum of expansion and contraction under heat and cold, and good edge strength, and should solidify in the temperature of the mouth and yet not crumble during the process of manipulation. The most perfect wax of this description has been produced by Dr. W. H. Taggart, and is now on the market. Dr. F. T. Van Woert of Brooklyn has made a metallic wax-former, by the use of which this material may be molded into various forms which will allow it to pass well up into the cavity, thus securing sharp margins in the deeper cavity portions. The proper temperature of this wax during the working process is very essential, and 136° F. is the temperature at which it works with the greatest degree of plasticity. The wax should be of sufficient hardness at mouth temperature so that it may be manipulated without distortion and carved to correct form. One of the difficulties experienced by careless operators is due to the fact that small particles of the wax which have been left in the cavity adhere to the inside of the wax matrix when it is replaced in the cavity for final adjustment. Blood may also attach itself to the inside of the wax, thus imparting a roughened surface to the inside of the cast inlay. After a matrix has been removed from the mouth, it should be washed in 3 per cent. hydrogen dioxid or in alcohol, to dissolve the blood and mucus and wash off the small particles of wax that might cling to its surface. If very thin tape is coated with vaselin and passed between the teeth over the surface of the wax form several times, the approximal surface may be left perfectly smooth. It is essential that if we expect to obtain a smooth cast, our matrix must be smooth, and if more attention were paid to this particular point, gold inlays would require very much less grinding and polishing after they have been cast. The sprue wire should be placed in the wax matrix as near the center of distribution of the gold as possible, for in this manner we are able to make a better casting than if the sprue wire is placed at some remote point which would cause the gold to have a longer flow before it eventually comes to a position of rest.

INVESTING.

There is no operation in the process of making gold inlays more important than investing, and uniform results cannot be obtained if the mixtures vary to any great degree. After a good investment material has been chosen and well tried out, and the proper mixture has been obtained, we should endeavor to make each subsequent mixture identical with the previous one. The simple way to do this is to place the water in the mixing vessel first. I prefer to measure this water in a small cup, and make the mixture in a rubber mixing bowl. If the water is placed in the bowl first, and the investment added slowly, so that it becomes thoroughly saturated, the mixture will be found correct. A thin mixture is always to be preferred to a thick one. When the mixture is complete, if the bowl be tapped a number of times on the bench, the small bubbles of air contained therein will rise to the surface. The wax matrix is then painted, using a camel's-hair brush, the excess is poured into the investment ring, and the matrix submerged in it. Some operators have a habit of tapping the investment ring after this has been done, hoping thereby to bring all of the air contained in the investment to the surface; this, however, always results in the contained air catching in the form of bubbles on the lower surface of the wax matrix, and being cast as part of the inlay. Too much care cannot be exercised during investing. When the investment has hardened for a sufficient length of time, we are ready to remove the sprue wire. Some operators make the mistake of pulling it out without using sufficient caution, thereby disturbing the matrix in the investment by enlarging the form to such an extent that, when the inlay is cast, it will not fit. If, however, the sprue wire is warmed sufficiently to slightly melt the wax, the wire may be withdrawn without endangering the position of the wax form. This is especially true when we are casting small inlays.

CASTING.

Perfect inlays cannot be cast in gold alloys which contain zinc or other base metals. If it is desired to cast a gold inlay with an alloy, in order to produce a harder inlay, which will not oxidize and leave a rough surface, the alloy should always be either pure silver or pure platinum, platinum giving the harder inlay, but alloying above 10 per cent. with this material will produce a purple-colored filling. The investment should be placed in a warm oven and not over an open flame, and the wax burned out by this method. Too rapid heating of the investment will cause boiling of the wax and a consequent roughening of the inside of the mold, which will produce a rough inlay. Inlays may be cast in either a hot or a cold mold. Dr. Taggart advises the use always of the cold mold, allowing the investment to cool after the wax has been melted out. I have obtained the most uniform results in casting in the hot mold, but I do not use the open flame for the purpose of drying out the mold or heat to redness. The gold used for casting should always be in a lump or button, for if scraps are placed in the crucible and the heat is applied, these scraps melt first and form little globules that run down into the sprue hole and close it either partially or fully, so that the molten metal is either completely stopped from going into the mold or is retarded in such a manner as to make a round-edge cast or imperfect inlay. The button of gold that is left after casting should always be remelted and pickled in acid before it is used in casting another inlay. If this is neglected, a certain amount of residue will cling to the gold and produce a rough cast. Pressure should always be maintained on the molten metal for at least three minutes, as this, to a certain extent, will prevent the gold from shrinking from the margins. When the gold is thoroughly hardened the investment may be plunged into water, and the inlay removed. If a perfect cast has been obtained, as should be the case, we are now ready for setting the inlay in position.

CEMENTING GOLD INLAYS TO PLACE.

If we find that the inlay rocks along the line of the neck of the dovetail, we know immediately that we have left some sharp angles at this point, which have been brushed off by the molten gold in flowing over them. If care is taken it is possible to trim either the cavity or the gold inlay sufficiently to allow it to go to place, although this is questionable practice, and it is preferable to make a new matrix. A portion of the inlay that goes next to the axial walls of the cavity must always be trimmed away so as to allow a perfect seating of the gold. In choosing a cement for the purpose of setting inlays, we should be sure that the granules of the oxid of zinc to be used are fine, because some of the cements on the market contain granules of oxid of zinc which are 1/500 of an inch in diameter; therefore a cement of this description would effectually prevent the inlay from being properly seated. The polishing of an inlay with a sandpaper disk before seating should always be done in the direction of the margins, so as to draw the gold through and allow a slight lap. This is also true in grinding down a set inlay in the mouth and polishing. A properly made inlay requires very little attention after cementation. If our technique is good, the inlay should be a finished piece of work before it is introduced into the mouth.

In this paper I have spoken only of the direct method of making cast inlays. I use almost exclusively in my practice the indirect or metal model method, by which I can obtain the most perfect results.

CORRESPONDENCE.

THE PIONEER WOMEN DENTISTS.

To the Editor of the Dental Cosmos:

Sir,—In the December issue of the Cosmos, Dr. James Truman, in a very instructive article anent "Women Dentists," is extremely unjust to the memory of the broad-minded men who constituted the faculty and trustees of the Ohio College of Dental Surgery in 1866. Permit me to quote from the article:

> Henriette Hirschfeld was, at the time of her graduation [February 27, 1869], supposed to be the first woman receiving the diploma of a Doctor of Dental Surgery. This was, however, proved to be a mistake, for the Ohio Dental College claimed, and proved, that a woman had been graduated from that school in 1866. Why this fact had been kept from the general dental reading public would seem to require explanation. It was not until the graduation of Mrs. Hirschfeld, in 1869, that this became public. . . . When, however, another school [the Pennsylvania College] was placed in the same dilemma, the Ohio College was quite ready to claim precedence.

If Dr. Truman will kindly read page 145 of the March 1866 issue of *The Dental Register,* he will find the name of Miss L. B. Hobbs (later Mrs. Lucy Hobbs Taylor) in the list of graduates of the Ohio College of Dental Surgery who received their diplomas on February 29, 1866.

The fact that Dr. Truman did not read this list at that time, or, having read it, has since forgotten, does not warrant him in his presumption of ignorance of published facts on the part of (to quote him) "the general dental reading public."

Pioneers, as they were, of dental education, and uncompromising advocates of woman's rights as well, James Taylor, Jonathan Taft, George Watt, and George W. Keeley were not the men timidly to await the action of any other body of educators to point out the path for them to follow.

Respectfully,

J. S. Cassidy.

Covington, Ky., December 15, 1911.

PROCEEDINGS OF SOCIETIES.

NATIONAL DENTAL ASSOCIATION.

Fifteenth Annual Meeting, held at Cleveland, Ohio, July 25-28, 1911.

(Continued from page 78.)

SECTION III: Oral Surgery, Anatomy, Physiology, Histology, Pathology, Etiology, Hygiene, Prophylaxis, Materia Medica, and Allied Subjects.

Chairman—WM. CARR, New York, N. Y.
Vice-chairman—RICHARD SUMMA, St. Louis, Mo.
Secretary—L. P. DOTTERER, Charleston, S. C.

TUESDAY—*First Session.*

The first session of Section III was called to order on Tuesday afternoon, July 25, 1911, at 2.30 o'clock, by the vice-chairman, Dr. Richard Summa.

Dr. SUMMA. I regret to announce that the chairman of the section, Dr. Carr, is unable to preside over the meetings on account of illness, and on his behalf I wish to thank the essayists and those who are to discuss the essays for their efforts toward making this meeting a success.

Dr. E. E. HAVERSTICK, St. Louis. In view of the fact that Dr. Carr has just undergone an operation and is unable to be here, I would move that we send him a resolution expressing our sympathy and our hope for his speedy recovery.

The motion was carried unanimously.

The first order of business for Section III, as announced by the vice-chairman, Dr. Summa, was the reading of a paper by Dr. R. W. BUNTING, Ann Arbor, Mich., entitled "Secondary Calcifications of the Tooth-pulp."

[This paper is printed in full at page 157 of the present issue of the COSMOS.]

Discussion.

Dr. MARCUS L. WARD, Ann Arbor, Mich. After reviewing the opinions of various writers regarding the value of the pulp to the tooth, the essayist says: "From the foregoing we may conclude that a healthy pulp is a valuable asset to a tooth which is to endure direct stress such as that of mastication or of support to a filling. In teeth, however, which are ground down and entirely covered by crowns, little crushing stress is brought to bear upon the dentin, and the danger of fracture is reduced to the minimum; in such cases the pulp is not essential to the welfare of the tooth, and may therefore be removed." From this we may infer that the essayist is willing to draw the line of distinction more plainly between when and when not to devitalize.

From the inception of crown and bridge work in dentistry, there has been a tendency on the part of the profession to construct such work over vital pulps. As conditions have demanded more of this work and as advanced methods of construction have facilitated its application, there has been an increasing number of adherents to the belief that the pulp should be removed in most cases where crowns are to be applied. Even the most enthusiastic of the specialists in this work admit, however, that the pulp should not be removed, even for crown work, until some time after the roots are fully formed, and the apical tissues are adapted to them. Most of these men admit, also, that in a few cases, mostly in older people, there is enough tubular calcification to admit of the preparation of the root and adaptation of a crown without much discomfort to the patient or the apparent likelihood that such changes will take place as the essayist has brought to our attention.

In most practices these two exceptions to the rule that pulps should be removed for crown work and preserved for filling operations form quite a minority of the number of cases demanding crowns or bridges. Those who have been so reluctant to devitalize teeth for crown work often make the claim that they do not have any bad results from placing crowns over vital pulps, but if the opinions of our foremost bridge workers are to be considered, it would seem that these men either do very little crown and bridge work or they do not see their results after such work has been put into use.

Dr. M. L. Rhein, for instance, says, in the *Items of Interest* for August 1910:

> What is the effect of a gold shell crown cemented over roots containing a living pulp? A careful investigation of the clinical methods in vogue at the present time, as compared with years ago, shows a constantly increasing ratio of pulp removal where an operation of this kind is to be performed. This is unquestionably the result of clinical deduction from the large number of alveolar abscesses that have been caused by such procedure. In a lecture before the New Jersey State Dental Society, given in July 1908, and published in the *Items of Interest* for November 1908, a number of radiographs were presented for the purpose of showing the effects produced by placing such caps over teeth having living pulps. A favorite argument of those who still cling to this form of practice rests on the assertion that a certain percentage of cases of this kind have been under their observation for a number of years without any resulting alveolar abscess. The hypothesis that such operations are non-injurious is not based on sound pathological principles, when a careful consideration is given to the diseased condition that ensues from such irritation of normal pulps. Skilful radiography of many of these alleged successful cases would show an astonishing proportion of pathological conditions that are not suspected from external appearances. The gold cap, acting as an irritant, produces an inflammatory condition of the surrounding parts. The results of such inflammation can never be accurately predicted.

Dr. Fred A. Peeso, in *Items of Interest*, May 1910, under the title "Crown and Bridge Work, Past and Present," says:

> As to the crowning of teeth with vital pulps, I think there has been a change from the early days when it was considered almost a crime to destroy the pulp, if there was any possible way of avoiding it.

Dr. Clarence J. Grieves said in *Dental Summary*, September 1910:

> Pulp devitalization and clean root surgery without damage to the vital apical cementum and the peridental membrane are the very foundations on which modern dentistry is reared. While it may not seem desirable in perfectly normal teeth, the question resolves itself into, first, whether we can do clean root surgery, and if we can, next, whether a few pulps are to be balanced, in value to the whole human economy, as against the masticating powers of a larger bridge.

Dr. Hart J. Goslee says in his book on crown and bridge work:

> For years no special thought was given to this feature, and such teeth as seemed to indicate restoration by crowning were treated much in the same manner as though fillings were to be inserted. The frequency of subsequent troublesome manifestations, however, including the ultimate death of pulps with the attending consequences of such pathological conditions as virulent peridental inflammations and alveolar abscesses, have since caused the subject to be more carefully considered, until it is now most generally conceded to be a safer precaution, in a great majority of cases, to destroy such pulps as a prophylactic procedure, as well as to facilitate the necessary mechanical preparation, when the crown is to entirely cover the end of the root.

Dr. I. N. Broomell in Cosmos, April 1910, under the title "The Adventitious Effect of Large Masses of Gold in Contact with Tooth Tissues," says:

> Ever since the introduction of crown and bridge work into the dental profession there has been more or less discussion in regard to the deleterious effect of large masses of gold in contact or nearly in contact with vital tooth tissues. Some operators have contended that no bad results would follow such operations, while others have been equally confident that the good offices of the supporting teeth would be naturally interfered with by completely or partially boxing them in with gold.
>
> The former class, true to their convictions, have not hesitated to attach large or small bridges to vital teeth either by partial or entire gold caps, while the latter class have invariably devitalized the pulp before performing similar operations.
>
> Clinical experience in general in regard to the ultimate effect of these operations has been such that deductions widely at variance have been arrived at. We have all had cases in which the vitality of the pulp has been lost in the course of time, under partial or full gold caps; likewise we have also had many cases in which under similar conditions the pulps have remained *apparently* undisturbed. In view of what it is proposed to relate in this paper, the qualifying word in the foregoing sentence cannot be too forcibly emphasized, that is, the pulps are *apparently* undisturbed.
>
> As a result of the microscopic study of a number of cases it is proposed to show that almost invariably the pulp tissue, and as well the enamel, dentin, and alveolo-dental membrane, are all more or less affected in various ways by such unnatural surroundings. Among the morbid effects produced are hyperemia of the pulp, dry gangrene of the pulp, calcification of the pulp tissue, sclerosis of the bloodvessels of the pulp, atrophy of the pulp, pulp nodules, secondary dentin, expansion of the dentinal tubules, with corresponding bulging of the dentinal fibers, pathologic pigmentation of the enamel and dentin, non-carious destruction of the enamel, as well as destruction by caries and perhaps molecular change in this tissue. Any one of the foregoing may be the primary affection after which a train of pathic conditions may ensue.

One would infer from these quotations that there is but one course to pursue in the majority of cases where large masses of foreign materials are to be brought into contact with the dentin. The clinical experience of Grieves, Goslee, and Peeso, together with the radiographs and sections of the essayist, Broomell, and Rhein, should be evidence enough to cause more of the profession to heed their warning.

The question of when and when not to devitalize seems to be so difficult of comprehension that practitioners often permit crowning operations to go undone, giving the preference to other operative measures. The result is that in such practices there are several patients who are deprived of some of the advanced resources of modern dentistry. There seems to be no further question that the pulp supplies the organic matter, in the dentin at least, with vitality, and the loss of the pulp involves loss of organic matter and decrease in strength. But of what especial interest to us is the strength of a tooth that is to be crowned! The factor of greatest importance is whether the root will be retained as well as if the pulp is removed. The evidence we have will bear out the assertion that such a root will be retained far better. If we are willing to follow the advice of our leading exponents of crown and bridge work and our pathologists, our course concerning devitalization for crown work is well outlined. We will devitalize for crown work, but the question remains how to proceed in inlay work, especially in gold inlays. Dr. Broomell's statements concerning the adventitious effect of large masses of gold in contact with the dentin have been indorsed by the essayist, and practically the same is true of the article by Dr. Rhein referred to. For no other operation is good tooth tissue more necessary than when an inlay is to be inserted, and to be of such quality the tissue must be vital. It would seem from this that our course is clear and defined for crown work, but in fillings, and especially gold inlays, we must rely upon our judgment as to which will produce better results for our patients—a devitalized tooth gradually decreasing in strength, with the absence of the conditions that have been called to our attention by the essayist and some of our other pathologists, or a vital tooth maintaining a greater part of its strength but which is infected.

Dr. H. L. WHEELER, New York, N. Y. I want first to express my very high appreciation of the value of this paper and the thoroughness with which the work has been done.

It occurred to me upon studying the illustrations sent to me by the essayist and upon seeing them on the screen today, that possibly an explanation of why the enamel is more readily cleaved from the dentin is indicated by the dark line running transversely through the dentinal fibers. This line possibly represents organic material and cemental substance which holds the enamel to the dentin. If this be true, it can readily be seen how the tooth built of inorganic material and the protoplasm of the dentinal tubules would lessen the strength of the contact or union between the enamel and the dentin. Of course, the destruction of the spindles extending into the enamel would be another cause for the weakening of the dentin as well as the enamel. It also occurred to me while listening to the paper that, if some means could be devised for obtaining skiagraphs of teeth showing the contents of the pulp chamber as plainly as those shown upon the screen, the difficulties of the diagnosis of a great many obscure cases of neuralgia and other disturbances about the head and face would be immediately solved. Here is a field for some ingenious dentist. We are often baffled by obscure cases which are due to such chronic pulp inflammation as has been shown to us by the essayist, and in which we are uncertain as to which pulp and tooth is the seat of the trouble. The individual who can show us the way to determine correctly the causes of such difficulties will confer a boon upon humanity.

Some years ago it was my privilege to examine about fifteen hundred skulls of prehistoric natives of this continent—by prehistoric I mean belonging to a period before this country became known to civilized man—and it was remarkable in what a large proportion of these skulls, which were evidently those of natives of forty years of age or more, the teeth were worn down practically to the original limit of the pulp chamber; in almost all of these cases secondary dentin had been formed. Only occasionally was it evident that the pulp had degenerated rather than formed secondary deposits of dentin, and, as was plainly shown, an abscess had developed. The number, however, in which degeneration of the pulp had taken place was very small proportionately, doubtless much smaller than in the present generation, because these individuals of prehistoric time lived a simple and primitive life and ate very simple foods, requiring strenuous mastication. They did not have the doubtful advantage of machinery and cold-storage plants and various accessories by which we obtain foods that can be swallowed whole.

In connection with the essayist's investigations, the study of exostosis at the root end, which is also responsible for serious neuralgic disturbances, should be elaborated upon, as such a study would be very valuable in making a diagnosis in these troubles. In a practice extending over twenty years, I have repeatedly observed in multi-rooted teeth that in two canals no calcification of the pulp had occurred, while in the third, usually the palatal canal of upper molars, the pulp was entirely calcified, and I have been able to withdraw it as a long and thin bone-like spiculum, so strong that it could not readily be broken between the fingers. If such teeth are filled no pus will be formed, as the amount of organic material left in that root-canal is so small. The pictures shown by the essayist have suggested to me that some of our distinguished colleagues who claim that they invariably remove every pulp thoroughly to the end of the root and fill the canal accurately must have met with many cases of pulp degeneration in which decalcification was going on. A great many times I have had the misfortune not only to be unable to remove pulps as thoroughly as I desired, but sometimes to break the end of a broach, although I am particular never to put an instrument revolving in an engine in a canal. I always manipulate root-canal instruments with my fingers, but in spite of that I have encountered trouble, and the essayist's pictures explain the reason therefor. Even if proper care is taken in drilling a supposedly straight canal to enlarge its orifice, the point of the drill will sometimes disappear. In such cases I do not try to remove the fragment, unless infection sets in, because I do not wish to run the risk of breaking another instrument. Dr. Callahan's method suggested some years ago as to the use of hydrochloric and sulfuric acid is a boon in such cases.

If Dr. Bunting continues his excellent work, he may perhaps devise some means of diagnosing these cases of calcification, thereby rendering a very great service to the profession.

Dr. H. M. **Semans**, Columbus, Ohio. Dr. Bunting has explained in a very simple and clear manner the reasons why the pulp remains after complete calcification of the tooth has taken place. Many dentists are accustomed to speak of the pulp as being absolutely unnecessary after this initial complete calcification, and are apt to operate accordingly, although they are quite familiar with the fact that the pulp possesses the latent or active—as the case may be—power through its odontoblastic cells to build up additional dentin as well as to solidify the dentinal tubules. The opinion seems to prevail that by this formation of secondary dentin nature takes care to ward off future dental troubles, but that dental art can dispense with the need of this activity. In his paper and by the accompanying photographs the essayist has clearly shown that nature attempts more or less successfully to take care of the ravages of time and disease, but also that mechanical art alone does not suffice to conserve the teeth. Dr. Bunting explains very clearly how and to what extent a cavity must be prepared so as to still preserve the normal building activities of the pulp, also what kind and by what manner of means the various filling materials should be used. He furthermore suggests that we should properly diagnose this building activity on the part of the pulp and the probability of tubular calcification as well as secondary dentin, and be governed accordingly in our operative measures.

We are all familiar with methods of medication by phenol, formaldehyd, iodoform, and various forms of conserving pastes used in most cases for the purpose of sterilization and reduction of pain, but we should also know whether this or that drug is suitable for inducing an overstimulated pulp to resume its proper constructive function. Almost all dentists use medicaments for the relief of sensitive dentin or the reduction of inflammations of the pulp without having a clear idea of the effects produced. The essayist's paper illustrates the need of a very much greater knowledge of the pulp and its functions after the initial complete development of the tooth, and should awaken new interest in the important question of pulp conservation.

Dr. Geo. H. **Wright**, Boston, Mass. I would like to ask whether the grinding down of a root for the fitting of a crown can cause calcification, and whether areas of absorption are found in the apical regions of crowned teeth which are subjected to a great deal of masticating stress; and whether, if this be the case, there is any evidence of calcific deposits outside of the tooth itself, *i.e.* of excementosis? Not having followed this line of study for some years, I would ask whether modern histology has any knowledge of the source of nutritive supply of the tooth outside the root-canal, that is, through the pericementum, the cementum, and possibly by way of the dentinal tubules. If such a source of supply exists, does it not account for the retention of teeth after the pulp has been removed?

Dr. W. R. **Clack**, Mason City, Iowa. It seems to me that we are sometimes confused as to whether the deposition of secondary dentin is the cause of a disease or the result. I am only relating my impressions received from cases that have come under my personal observation, and am not trying to find fault with anyone's theory. The deposition of secondary dentin due to mechanical abrasion is in my opinion more important than that which may be said to be due to irritation of the pulp by the infiltration of acids. Dr. Wheeler, in speaking of the prehistoric races of this country, raised a strong argument, but in my opinion he did not carry it far enough. I was reared among the American Indians. I have hunted for months with them, and considering the manner in which they chew their food and the quality of the food they eat, the mechanical abrasion shown in the teeth of these people is not at all surprising. Under our present conditions, children after being weaned eat foods that are not only ground and ready for the stomach but almost predigested. They have no use for their teeth, and nature, abhorring the disuse of any function, often fails to develop these teeth fully. The infiltration of acid in rapid caries is too fast to allow nature to throw out such secondary dentin as would be of any particular use. I wish to differ from the essayist in regard to thermal shock through a large mass of gold being due to the gold. Such shock is induced only in very large cavities, where in my opinion the dentin, although apparently sound, has been permeated by the acids of caries to such a degree as to make a very good conductor of thermal shock to the pulp. I have very little fear of thermal shock through absolutely sound dentin that may have been reached by cutting away sound enamel upon the principle of extension for prevention. I have little fear of thermal shock in such a cavity, but I have seen disastrous consequences from thermal shock in teeth in which the acids of caries have penetrated to the pulp previously.

In one of the pictures the deposition of secondary dentin was shown. I wish to ask the essayist whether it is not possible in a multi-rooted tooth, especially when a canal is narrow, crooked, and constricted, that this dentin never reaches the pulp chamber? I have seen many teeth, and I hope to show one, in which the deposits of secondary dentin have never reached the pulp chamber, while the roots were filled therewith up to the apex. In cases where the secondary dentin is deposited upon the pulpal wall, beginning there and attaching itself firmly to the dentin of the tooth and filling the pulp chamber, this secondary dentin will be of benefit to the patient, but the kind of secondary dentin which is deposited only in patches causes trouble. In attempting to anesthetize a pulp by pressure anesthesia, every practitioner has encountered difficulties, and when he finally succeeded in forcing enough cocain into the canal to produce anesthesia sufficient to remove the pulp, he discovered a pulp-stone acting as a piston and filling the root-canal so that the cocain could not penetrate to the sensitive portion of the pulp.

In abscess at the apex of a tooth, considering the presence of bacteria, the physical condition of the patient must be an important factor. I have frequently sterilized and filled such roots as perfectly as possible and crowned the teeth or inserted in them inlays or fillings, and for a number of years the operation was perfectly satisfactory as long as the patient was in good health, but if the patient's health failed and his vitality was lowered, the bacteria became active, and recurrence of the abscess occurred.

I should like to ask the essayist, regarding his quotation from Dr. Miller, whether he meant that a diseased pulp can revive and throw out healthy secondary dentin, or whether portions of a pulp may become isolated while the pulp is in a healthy condition, and throw out secondary dentin.

Dr. BUNTING (closing the discussion). I appreciate very heartily the remarks of those who have so liberally discussed my paper, and wish to thank them for their interest in this subject and their valuable suggestions. I am especially grateful to Dr. Ward for his *résumé* of the opinions held today regarding the advisability of crowning vital teeth.

It should be understood that this subject has been taken up from a scientific viewpoint, and I want to thank the discussers for emphasizing its clinical significance.

The next order of business was the reading of a paper by Dr. C. M. McCauley, Abilene, Texas, entitled "Amalgams: Their Manufacture, Manipulation, and Physical Properties. Cements: Their Manipulation and Physical Properties."

[This paper is printed in full at page 174 of the present issue of the Cosmos.]

Discussion.

Dr. F. B. Noyes, Chicago, Ill. We are to be congratulated on having had presented to us a paper which represents such a remarkable amount of work. The value of such a paper lies in bringing again to the attention of the profession the scientific facts which are at the basis of such a useful material as amalgam. It has always seemed strange to me that the work done in this field fully eighteen years ago by Dr. Black has produced so little effect on the dental profession, and so little change in the amalgams which are being used today. The profession is using, almost by the ton, alloys which so shrink, according to laboratory experiments, that we cannot make a perfect filling. Why do we pretend to be a scientific profession and laud our scientific attainments to the skies, and yet disregard the scientific basis of one of the most important materials we use? I hope that the renewed presentation of this subject by Dr. McCauley will bring it to the attention of the younger practitioners at least, so that they may use this material scientifically in their own practices. If the paper will accomplish that result, it will do a vast amount of good. We are all indebted to Dr. McCauley for repeating the work that was done before and for bringing this question again to the attention of the profession, and demonstrating the correctness of the interpretations of previous observers.

Dr. D. M. Gallie, Chicago, Ill. In discussing this excellent paper I shall simply say a word on the necessity of proper manipulation, and on purchasing the best alloy that the market will provide. When we stop to consider that men like Dr. Black, Dr. Wedelstaedt, Dr. McCauley, and others, have worked so assiduously to perfect the manufacture of alloys, and acknowledge that they still have failures, what can we expect of the alloys that are being peddled from office to office at one dollar or seventy-five cents an ounce. If scientifically prepared amalgams fail, what can we expect of the average alloy that many practitioners are using? Still, no matter how skilfully alloys are manufactured and how pure the metals may be that go into their manufacture, the manipulation of this material, the proper preparation of the cavity and the finishing of the filling are, in my opinion, of the greatest importance. A few months ago Dr. Southwell held a clinic at Chicago demonstrating the results of the following interesting test: Matrices were sent to different operators with the request that one cavity be filled with gold and one or two with amalgam. Salt-water pearl matrices were employed to demonstrate the adaptation of the gold and its specific gravity. These pearl matrices were also used for the amalgams, but since they proved a failure, several steel tubes were sent out with the request that these operators fill them with the same kind of amalgam as they used in their offices. These fillings were tested. Some practitioners who are supposed to be representative operators and who showed a perfect score in gold fillings, indicating their great manipulative skill, presented amalgam fillings which developed leakage when subjected to only three pounds of pressure. Judging from their gold fillings, these men certainly could manipulate amalgam, and the very fact that the most skilful gold operators fell short in the working of amalgam showed that there must be some intrinsic fickleness in the material itself. This fickleness and uncertainty has brought me to the conclusion that we cannot be too careful in purchasing alloy, and must exercise all possible skill in its manipulation. We must also see that the cavity is properly prepared. The essayist has shown on the screen tonight a number of fillings that have failed because the cavity was not properly prepared to receive the filling. We must bear in mind that the fillings mentioned above were made in steel tubes and rested upon a solid foundation, but what can we expect of a filling which is inserted in a cavity without the use of a matrix, or without sufficient resistance at some point to allow of proper condensation? Every amalgam filling in an approximo-occlusal cavity should be inserted with the aid of a matrix, so that there will be no point of least resistance, in other words, so that the cavity is surrounded by four walls. I believe that as many teeth can be saved with amalgam as by any other means, and failures are due to poor quality of the alloy, faulty preparation, or faulty manipulation of the material.

As to cements, it is very natural, considering the present perfection of the inlay, to study the medium by which the inlay is held in position, because no matter how perfectly an inlay is made, it is useless unless the medium by which it is held in place is durable. The manipulation and the quality of cement, therefore, should be carefully studied, and I hope the essayist will continue his investigations.

Dr. S. C. G. Watkins, Mont Clair, N. J. I cannot allow this opportunity to go by without saying a word at least of commendation of the paper, the hearing of which has well repaid me for my trip here from New Jersey. This society is to be congratulated on having such a splendid exponent of amalgam and cement, and I admire his patience and perseverance in making these tests.

It is an old but very true saying that if a thing is worth doing at all it is worth doing well, and if we follow the teachings that we have heard here this afternoon, I know that we shall all do better work than we have been doing.

The manufacture of amalgams is of very great importance to us. I remember years ago a dentist whose name is familiar to all of you made an amalgam which enjoyed a great reputation. Instead of using pure silver, this dentist used all government coin, which contained a little copper. After he died his formula went into the hands of one of the largest dental manufacturing companies in the world, and immediately the substance of that amalgam, or its working qualities at least, changed, although it was supposed to be made after the same formula. I have always felt that the government knew better how to melt silver and copper together than this manufacturing company did, because the amalgam certainly seemed better when it was made by the original maker.

Dr. A. P. Burkhart, Auburn, N. Y. I am very much interested in the paper presented by the essayist. As the last speaker said, we can hardly realize what a great amount of labor the essayist has performed. He has pointed out to us some of the failures and their causes. One of the causes of failure lies in the manipulation of the material as it comes to us, rather than in the possible chemical changes described. If the dental profession will use the material which the essayist has brought to our attention with the same care and discrimination as they use gold, I am sure that better results will be obtained. Many failures in the use of amalgam are due to careless manipulation. No filling can be placed in a tooth with satisfactory results, no matter what material be employed, unless great care is exercised in the preparation of the cavity and in the final preparation and introduction of the material itself, whether it be cement or amalgam. If the rules laid down by leading operators for the preparation of cavities for gold fillings were followed there would be fewer failures when amalgam is employed. There is no question in my mind that a greater number of teeth may be saved by amalgam than by any other material, although I admit that it is not always suitable. When the cavity is properly prepared and the rubber dam and a good quality of amalgam are used, there can be no question as to good results.

One speaker has said that a great variety of amalgams at almost any price are offered to the profession. My experience has shown that the very best is none too good.

Dr. H. B. Tileston, Louisville, Ky.

I would like to ask Dr. McCauley, who has made these extensive experiments and who has been with Dr. Black, what alloy gave the best results, and what he considers a scientifically made alloy. I see no objection to discussing among ourselves what manufacturer is making a good alloy that we may use.

Dr. C. E. WOODBURY, Council Bluffs, Iowa. More fillings of amalgam are made than of all the other materials. All amalgams should therefore be tested as to their efficiency, and the results should be published. I have no doubt that Dr. McCauley would be willing to make these tests and present the results to the society, if he were asked to do so, and this, in my opinion, would be the best way to bring this matter to the attention of the profession, because we are not in position to make these tests ourselves. It would be of value to us if Dr. McCauley would purchase a sample of the different amalgams in the open market, test them, and give us the results of these tests.

Dr. J. N. CROUSE, Chicago, Ill. I should like to know the conditions of the different metals used in the formulæ. The essayist's findings do not correspond with my experience. There seem to be too many errors in the different proportions, and the metals used probably were not pure. A pure amalgam cannot be obtained unless the metals employed are purified. Moreover, the alloying must be done so that the metals will melt uniformly, which is very simple if the proper apparatus is used. I made the first tested amalgam on the market; it was tested with instruments designed for this purpose before Dr. Black had published anything on this subject, and there is no alloy offered on the market that I do not test under the micrometer.

Dr. MCCAULEY (closing the discussion). In reply to the first question raised, I would say that too much stress cannot be laid on manipulation; yet no operator, however skilled he may be, can successfully manipulate a defective alloy or amalgam and make a perfect filling. I do not want to detract anything from the importance of proper manipulation, but must emphasize the fact that the alloy must be a good one.

The question as to what alloy is best to use is the most difficult to answer. I have stated in my paper that in my opinion there is no alloy on the market today that can be depended upon, unless it is balanced according to the scientific principles of balancing alloys. I have also stated that there are less than a dozen manufacturers who are known to possess the proper instruments for this work. Dr. Crouse and others have these instruments, and I feel warranted in saying that the manufacturer who possesses them and uses them carefully in making his alloys, will produce a perfect alloy. There are a few manufacturers whom I know to possess this testing apparatus, but unless I could give the names of all, it would not be just to name these few.

Dr. Crouse inquired as to the purity of the metals in the alloys tested. The drawing shown was intended to demonstrate that small variations in the fineness of metals produce a great difference in the product of the alloy. It is practically impossible to secure absolutely pure metals in quantities sufficient for making alloys, and at a price which would warrant their use.

Dr. CROUSE. You can have the chemist refine them for you.

Dr. MCCAULEY. The head chemist of one of the leading chemical houses of this country told me that he could not guarantee the purity of silver nor could he guarantee equal fineness in every case. It is possible to obtain it 999/1000 pure, or even a little better, but absolutely pure silver is very difficult to obtain. Hence in making alloys we are forced to depend upon what we might call commercial silver, which is refined by a process applicable to large quantities such as are necessary in making alloys. No alloy that is not balanced by the manufacturer can be depended upon, and every practitioner should ascertain for himself whether or not the manufacturer is balancing his alloy.

Dr. TILESTON. In the samples of cement passed around and showing the effect of shrinkage, the names of the manufacturers are indicated, and I do not see any objection to telling us what is the best alloy. How about Fellowship?

Dr. McCauley. If I were in position to do justice to all the manufacturers, I would make definite statements. I have made cement tests for two years, but with amalgam I have experimented only a short time, and have not covered the entire field by any means. If I can make arrangements to have the continuous use of a micrometer and dynamometer, I shall test every amalgam obtainable on the market, and then shall report my findings to this society, indicating the name of the alloy and its behavior in a cavity.

I want to thank you for the kind reception accorded to my paper. If in the future I can be of any service to this society, it will be a great pleasure for me.

Dr. Summa. In dismissing this section, I wish to say that in my opinion this is a subject for the manufacturer and not the dentist, because the dentist is unable to conduct such tests at all times. We shall, however, remember Dr. McCauley's promise to give us the results of his experiments.

The section now stands adjourned until Thursday evening, at 8 o'clock.

(To be continued.)

NATIONAL DENTAL ASSOCIATION—SOUTHERN BRANCH.

Fourteenth Annual Meeting, held at Atlanta, Ga., April 4, 5, and 6, 1911.

(Continued from vol. liii, page 1179.)

Thursday—*Morning Session.*

The next order of business as announced by the President was the reading of a paper by Dr. H. B. Tileston, Louisville, Ky., entitled "The Care of the Mouths and Teeth of Little Children."

[This paper is printed in full at page 197 of the present issue of the Cosmos.]

Discussion.

Dr. W. C. Miller, Augusta, Ga. The paper is an excellent one, and having been fortunate enough to read and reread it, I will dwell on a few points that I have noted.

My attention was particularly attracted to the essayist's remarks in regard to controlling the diet of a pregnant woman. That, in my opinion, is one of the greatest difficulties which we have to contend with, and which I do not believe it is possible to overcome. We may, in some cases and to some extent, control our women patients' diet after parturition, but during the period of gestation I think it is absolutely impossible. We all have seen the lack of attention in this respect on the part of the family physician. We have frequently been met on the street by the husband of some woman patient with the remark: "Doctor, my wife will be down to see you soon; we have a young baby at home, and nearly all her fillings have fallen out." When we ask if the physician has prescribed any mouth-wash during the period of gestation, the answer is, "No, none at all." This is a point that should be impressed upon the family physician. We realize the importance of oral prophylaxis, but we are not in as close touch with the family as is the physician.

The essayist speaks of the substitution of magnesia for lime during the development of the teeth, which deserves our careful consideration. How many of us during our school years have been taught to use magnesia during this critical period! I have in my family, I am sorry to say, evidence of this injudicious advice—*i.e.* lack of lime salts in my children's teeth, which I feel as a reflection on myself, and I dislike to have these children go out among people and be pointed out as the children of a dentist. I have used all possible precautions, and whether magnesia has been substituted for lime or whether they did not receive proper nourishment, I am not prepared to say, but something is lacking, and I much fear that in the permanent set I will have the same trouble to contend with as in the deciduous set. I may add that both of my children were bottle-fed.

I believe in lancing the gums, and shall until I am convinced that it is wrong. The essayist impressed us with the importance of the child's first visit to the dentist. Usually a child is presented suffering with its teeth and with a swollen jaw, and the first word from the parent is, "Doctor, you must do something for the child; we cannot sleep at home." The parents seem to put more stress on their own comfort than on that of the child. They fail to realize the little one's suffering and are more concerned about their being disturbed at night than about the condition of the child. There, in my opinion, we have a wide field for education.

I do not use arsenic in deciduous teeth, but pressure anesthesia. After securing the child's confidence, usually sufficient pressure can be produced simply by the closing of the jaws.

Dr. J. P. Corley, Greensboro, Ala. I would like to have a half-hour to discuss this paper, which is one of the most praiseworthy that I have ever heard, but in view of the lack of time I will only touch upon one feature which, I think, is the greatest problem that confronts us today, namely, the education of the mother. In order to reach the children before any damage is done to their teeth, we should equip our offices with an educational exhibit. The exhibit which you see before you is very incomplete, but it has some important educational features.

Let us not be bound by traditions of the dead past in regard to advertising methods which would be educational and would convince the mothers of the necessity of attention to the child at an early age. I have here models [demonstrating] which represent the mouth at the ages of three, five, seven, nine, eleven, thirteen, and seventeen. Here is a model of the mouth of an eleven-year-old child, which shows a deformity in consequence of the loss of the permanent molars. There are eight models in this series, showing the effects of extraction at different ages. In connection with these models I show pictures of a profile, bringing out the deformity produced in the face, a deflection of the nasal septum and stenosis, also protrusion of the teeth. We can show the effects of negligence to the layman much better on models than by telling him. I also take up the technique of the dental toilet. This collection shows all the necessary equipment for scraping and scouring the mouth, and keeping it clean. In regard to orthodontia, I have models showing the distortion of the face, the loss of masticating surfaces, etc. We ought also to have an orthodontic appliance and explain the principles upon which it works. Some of our best orthodontists use fixed appliances, which render it impossible to keep the mouth clean. Let us, instead, make removable appliances which the patient can remove in order to eat in comfort, and replace after eating. I show here a case [demonstrating] in which within eight months a perfect condition of symmetry was produced—an expansion of a quarter of an inch in the arch, and the establishment of perfect occlusion. This patient never ate with that appliance in the mouth.

We should also have models showing the effects of tartar on the teeth, and explain to them the so-called Riggs' disease. We ought also to have all kinds of toothbrushes to suit mouths of all shapes, and we should require the patients to have the proper equipment, get it for them, if necessary, and require them to use it. We should instruct them in the use of the mouth-mirror, and should show them, by practical demonstration, how to brush their teeth. By having these models in our offices, we can show the patients the difference between cross-brushing and brushing lengthwise. We should tell them that if they will not get the proper outfit, and use it, they will have to secure the services of another dentist.

Dr. TILESTON (closing the discussion). I appreciate the difficulties of the situation, and I am not at all sensitive about not having my paper more fully discussed. This subject is one that you should look up later and think over.

Dr. Miller spoke of the control of the diet of the mother previous to the birth of a child. The dentist has not much opportunity personally to direct the diet, but he can by closer association with the family physician exert some influence in this direction.

Dr. BRABSON then presented the following resolution, which was on motion adopted by the society:

> Inasmuch as the time heretofore set apart for the work of this association is always too short, being limited to three days, thereby rushing through business that should be carefully considered in session, therefore be it
>
> RESOLVED, That the time be extended to four days hereafter.

Dr. T. P. HINMAN, Atlanta. I wish to make the members acquainted with the unfortunate condition of an esteemed member of our profession, namely, Dr. A. H. Thompson of Topeka, Kans. Dr. Thompson has been so unfortunate as to become paralyzed and incapacitated for the practice of his profession. His invaluable scientific work in comparative odontology is well known to all, and his life has been devoted to the upbuilding of dentistry.

The next order of business was the reading of a paper by Dr. N. C. LEONARD, Nashville, Tenn., entitled "Surgery of the Pulp, and Its Relation to Periapical Infection."

[This paper is printed in full at page 188 of the present issue of the COSMOS.]

Discussion.

Dr. H. B. TILESTON, Louisville, Ky. A very interesting subject has been presented, one which might be discussed at great length if we had the time. The manipulation of cases in which the pulp has been removed is a subject upon which there is a slight difference of opinion, though not a very vital one. A few years ago Dr. Smith said that anyone who used arsenic in teeth was guilty of malpractice. That was about the time when the wave of pressure anesthesia was going over the country. A great many who were using arsenic at that time began to employ pressure anesthesia in devitalizing pulps, because this operation was a rapid one; the pulp could be removed and an immediate root-filling be made at one sitting.

One reason for not immediately closing the wound created by the removal of the pulp is that there can be no escape about the end of the root for any accumulation of serum from the wound caused by the operation, and if any such accumulation occurs the serum should be allowed to escape through the canal. It is very easy to make a dressing which will preserve the aseptic condition for forty-eight hours, and then to proceed with the operation.

I would also like to call attention to another difficulty arising in this connection—namely: When the pulp is anesthetized and the anesthesia is carried beyond the end of the root, we may pass through the root-canal without the patient notifying us of the fact, because he does not feel any pain, and thus we may force the filling beyond the apex. I am not so sure of nature being willing to take care of any clot left about the end of the root. I presume, however, that if the blood is entirely sterile, and not a great quantity of it is present, the clot will be resorbed successfully.

Dr. S. B. COOK, Chattanooga, Tenn. In substantiation of Dr. Leonard's position, I believe, when we have extirpated a freshly exposed pulp by the method indicated, that the immediate filling of the root is an absolutely aseptic process. I believe that with proper manipulation a thoroughly antiseptic condition is established, and there is no possible chance for subsequent infection.

In regard to the use of arsenic, I think that when the wave of pressure anesthesia was going through the profession we discarded that drug almost entirely. If properly manipulated and employed in infinitesimal quantity, arsenic is a valuable drug in the dentist's hands. If in a hurry, we can clear the way a few hours before by the application of the arsenic, and I therefore think that we are not justified in discarding this drug. In my recollection I have never had a case of immediate root-canal filling in which soreness or complications arose afterward.

Dr. Leonard (closing the discussion). I appreciate the remarks made by the gentlemen in discussing the paper, and think there is very little for me to add in closing.

I would like, however, to say in defense of this method in regard to its being more difficult than others, that, with a little experience, the operator becomes so familiar with the technique that it can be applied just as expeditiously as any other, especially since the whole operation can be done at one sitting. If it is not convenient to complete the operation when the patient first presents for treatment, some palliative remedy may be applied, and an appointment made for a subsequent sitting, instead of applying a devitalizing agent. From my own practice, in which I employ this method exclusively, I have come to believe that more satisfactory results can be obtained than by applying arsenic.

I will emphasize again that I should like to have fellow practitioners who may employ this system observe carefully their results in cases of imperfectly developed, incomplete roots in children whose incompletely formed molars, for instance, have been attacked by caries early. In such cases we have been warned against the use of any method of pulp removal. I have never seen any difference in results so far as I have been able to observe these cases. We have to treat a large number of teeth with imperfectly formed and developed roots, the preservation of which is most important.

The next order of business was a paper by Dr. T. P. Hinman, Atlanta, Ga., entitled "Cast Gold Inlays."

[This paper is printed in full at page 203 of the present issue of the Cosmos.]

Discussion.

Dr. S. B. Cook, Chattanooga, Tenn. I have read the essayist's paper with a great deal of interest, and have noted several points that I wish to discuss. He has done as much or more in this special field than any practitioner in the South. Fifteen years ago I saw a gold inlay for the first time, one which Dr. Hinman had made, and I trust he will excuse me for telling how he made it. He prepared the cavity, took gold foil, burnished it into the cavity, and flowed 18-karat gold solder over it.

A few years ago, when we heard the first discussion on porcelain work, I went to Old Point Comfort, and found Dr. Hinman using the Jenkins method; whereupon I secured a Jenkins outfit. The next time I saw him he was using the Brewster bodies, whereupon I secured a high-fusing furnace, and gave the old outfit away. The next time I saw him, he said the medium-fusing inlay was the best. When I saw him again he said that the high-fusing porcelains were the only ones he was using. I have, however, derived a great deal of good from my intercourse with Dr. Hinman, and I believe that whenever the operator is careful and exact in his technique, he will never have any trouble with porcelain inlays, and that every failure is his own fault. Certain cavities can be filled better with inlays than with any other filling. In those cavities which extend gingivally on the approximal surfaces in bicuspids and molars, this method offers an advantage over any other. If any overlapping gum tissue is forced away and the cavity is prepared as the essayist indicates, leaving no little checks or rough, brittle edges, the inlay will fit and will be permanent.

When the cavity preparation is extended under the gum, with a strong solution of silver nitrate applied to the fundus of the cavity, providing against the possibility of its reaching the cutting edge, the recurrence of caries in my opinion can be successfully prevented. In children's teeth the action of silver nitrate is almost wonderful.

In setting inlays, the great mistake is often made that pressure is not kept up sufficiently long while the cement is setting, which accounts to a great extent for the lines showing around fillings.

Of investments, I believe the Standard to be the best, as it makes a smooth inlay, and when hardened will not break. I have discarded brushes altogether in investing. I used to put the investment on the impression with a small brush, and make another mixture for the bulk of the investment, but now I make one mixture for the whole work. Just before I mix the investment, I put the impression in water then dip it in the mixture, set it on a table, and pour my investment.

With regard to wax, which is the most important factor of all, I regard Klewe & Co.'s wax as the ideal, after trying every one that has been on the market. I believe, after having tried three, that the best appliance for casting is the Elgin atmospheric machine, so called. In that machine an absolutely uniform and exceedingly strong pressure is obtained. It is so simple and easy that it is a pleasure to work with it.

Dr. N. C. Leonard, Nashville, Tenn. I should like to emphasize that in setting inlays the operator should be careful to cover thoroughly every portion of the gold that comes next to the wall of the cavity. It is also well to fill the cavity itself, or be certain that the cement comes into contact with every part of the wall before the inlay is forced home. The reason for that is that cement under pressure always flows in the direction of the least resistance, and if there is any point on the surface of the inlay that is not covered with soft cement, the cement is apt to flow away and leave a little place under the inlay imperfectly filled.

Dr. Hinman (closing the discussion). In reference to setting the inlay with cement, the only safe way is to mix plenty of cement, put plenty in the cavity, and always cover the inlay itself; then the operator is certain that the cement is in contact with every portion of the inlay as well as the cavity walls.

The purpose of my paper was to touch upon some of the points that have caused me considerable trouble in casting and making inlays, and to give some suggestions that would probably be of help in everyday practice. I do not know all there is to know about inlay work, and want to know as much as I can, but I am certain that if the operator is careless in regard to technique in inlay work, he invites failure. The inlay is the poorest preservative measure, if improperly executed, but if properly made it is the best filling we have so far found in our professional experience.

Dr. Crenshaw. I wish to move, Mr. Chairman, that a copy of the resolutions adopted yesterday be sent to Senator Overman.

The motion was seconded and carried.

The next order of business was the reading of a paper by Dr. J. P. Corley, Greensboro, Ala., entitled "The Adolescence of the Dental Profession," as follows:

The Adolescence of the Dental Profession.

"And Joseph dreamed a dream."

In the life of all sentient things there are six stages, *i.e.* embryonic, infancy, childhood, adolescence, maturity, and senility. Only the metaphysician is concerned with what follows after the last.

Childhood is the objective age. There is no vision, no imagination. Things are interpreted and understood in terms of the seen. The child is selfish and self-centered, imitates but produces not, takes but does not give. His first thought is for himself, not for others. He forms no partnerships and no alliances, entangling or otherwise. He is the soul and center of the universe.

With the advent of adolescence the subjective sense begins to develop, and vision and imagination begin to grow —things seen now suggest things unseen.

Man's ego merges into that of his fellows, and he recognizes the force which created him. He learns to produce; to give and take and give again. He begins to recognize his obligation to his fellow man, to develop social instincts and pool his resources. He creates ideals and strives to attain them, and is satisfied with nothing short of the infinite and ultimate.

This is the crucial period, when the foundations of his future life and the corner-stone of his character are laid. At twenty a man's possibilities are determined and his destiny written. Destiny is determined by environment plus heredity.

The order of nature is one long story of growth and development. There is no such thing as autogenetic spontaneity. If there were, the universe might be swept into order or chaos in one short generation. There are epochs, to be sure, but they are the natural fruit of long accumulated environment.

Professions also have six stages. In the eighteenth century dentistry as a profession was born; the nineteenth witnessed its infancy and childhood; with the dawn of the twentieth it is approaching adolescence.

I say *approaching* advisedly, for when I remember that only ten per cent. of the people receive dental attention, and that in the United States last year there were approximately eighty millions of artificial teeth made, I am impelled to believe that we are little removed from infancy.

Forceps are manufactured by the thousand, plates are made by the tens of thousands, and teeth are extracted by the million, and still we reach only ten per cent. of the people. If we served them all, and dentistry were practiced on all of them, as it now is on a few, we should need to beat our plowshares into forceps and honeycomb the earth for feldspar, silex, and kaolin.

When we say we are approaching the age of adolescence, we are illustrating the psychic phenomenon of picturing the thing which is as the thing which ought to be.

Men who are among our best extract lower first permanent molars in young patients. Men among our best prosthetists equip the mouth with mechanisms which a dentist, even though he were in constant attendance, could not keep clean. Men among our best operators practice extension rather than sanitation for prevention. Men among our best orthodontists harness up the mouth with apparatus which makes it a veritable cesspool. Men who hold official positions in their state societies extract teeth, and then nurse the astounding delusion that, after this is done, they can establish the facial balance and normal occlusion.

Notwithstanding these undeniable evidences of puerility, we are beginning to see faint shimmerings of the rose-tinted dawn of a new era. We are beginning to dream dreams and see visions.

During the last two years hundreds of thousands have heard the gospel of mouth hygiene and immunity through sanitation. Thousands of children have received attention through free dental dispensaries. Municipalities and state boards of health are taking up the promotion of the community's dental health. Dental colleges are preparing their students to teach oral sanitation to the public. Dental journals are filling their pages with literature on this subject, and the commerical and professional interests are joining hands in the interest of this cause.

In fact, every interest identified with dentistry, from the commerical charlatan and the professional quack at one end of the line to the commercial artist and the professional scientist at the other, is waking up to the marvelous possibilities of the new propaganda.

The mighty undercurrents of zeal and devotion to a higher ideal, and the cross-currents of greed and selfishness, are developing a situation which threatens to become chaotic.

This is but the logical course of evolution. It is the maelstrom of adolescence. There was never a time in the history of this or any other profession when the flood-tide of opportunity tipped so high a crest or when professional chastity and transcendental zeal were at so great a premium.

Truly the hand which lays the foundation writes the dimensions of the dome, We are building not for ourselves alone, but we are writing the status of dentistry when it shall have reached the full stature of manhood. The earth is still young, the human race is young, and the dental profession is very young. You shall not say that it is a pipe dream when I maintain that the time will come when the dental forceps will be found only among the dusty rubbish of a museum of antiquities.

Last year I offered a resolution that it be declared the sense of the Southern Branch that no man should be accounted eligible to membership on a state examining board if he had tartar on his teeth. The motion was lost—but we are young, very young, and if my time of probation will be extended to the full threescore years and ten, I shall live to see not only such a motion passed, but the law enforced.

It is a never-ending source of wonder that while all agree as to the necessity for educational work, and admit the practical possibilities in the matter of eventual remuneration to the dentist, of benefit to the public, and of honor and prestige to the profession, so very few will even reply to a letter which the official representative of the Southern and National Associations addresses to them in reference to this work.

However, this too has its rosy side. Among the letters received this year two stand out as conspicuous examples of the spirit of the profession when it shall have fully reached adolescence.

The first is from a man who, born before his time, camped on the frontiers, blazing the way for the multitude which will build cities where he pitched his tent. The author of the other letter is in the full flush of rich young manhood, gifted beyond his fellows both in ability and opportunity, and with the wealthy heritage of a sire who is one of our oldest and most beloved members.

Tucson, Arizona, October 26, 1910.

My dear Dr. Morgan,—In my rejuvenation and new lease on life, I hardly think it fair that Corley should go to reminiscing so far back in the past. But of a truth, though at the present I am feeling like a youth, it is a good number of years since I commenced my principal life-work in the field of dentistry.

In all these years—think it is over forty—I have never claimed honors in the field of originality, but have appropriated the ideas which have been shed from greater lights, and have profited by their experience. In a few instances I have put to successful test some truths emanating from those who figuratively, if not literally, have communed with angels, whose visions and inspirations I have accepted as facts and have proved them such, have adopted and used them, and endeavored to pass them along.

It is a great pleasure to me to find those who have profited by my efforts and are zealous that due honors be paid me. What I have given I have freely received, and have freely given again. I desire to make no claim for precedence. If I have caught on early, and have been able to pass it along, to know that it has been helpful to others is honor enough for me.

As to the motto, "Clean teeth do not decay," I cannot tell just when I began to use it on my bill-heads. It may have been in the eighties or early in the nineties. It was first placed on some small bill-heads I had printed by Charles Brandon. I have had several lots printed since. A reference to my account with him might establish the date.

Without any claim for originality, I have always promulgated the idea of strict prophylaxis, and that prevention was better than cure. I am especially glad that Corley is at work in so prolific a field of endeavor. It will be congenial to him. I wish him abundant success.

Ever yours,

1500 Locust st., Philadelphia,
March 7, 1911.

My dear Dr. Corley,—You are most welcome to use anything of mine you may find which will be of the slightest service to you, and I do not wish any credit for it.

If you have no copy of the slide about which you write, I shall be very glad to send you one which may be better than that obtained from photographing a half-tone.

You are doing a very good work and I wish you every success in it.

With kindest regards, I am,

Sincerely yours,

There are three classes of men in the dental profession: Those who cannot be induced to engage in the work on any account—making 90-plus per cent.; those who will do something if they are assured of full credit, pressed down and running over, 9 per cent.; and those who, like the authors of the foregoing letters, seek no reward. But we are young yet, very young.

It would be preposterous to expect a profession which is but a few generations old, and whose recruits come almost entirely from the agricultural, industrial, and commercial classes, to have developed the artistic, scientific, and altruistic spirit.

The heritage of all the past is ours. The responsibility for all the future is upon our shoulders. We are approaching that marvelous, mysterious, unspeakable crisis—the crucial era of adolescence.

Discussion.

Dr. F. A. Johnson, Sheffield, Ala. I can add nothing to this most excellent paper by Dr. Corley. I admire the great work that he is doing in this field. I admire his enthusiasm, of which, in spite of ourselves, we cannot help but absorb some. He is doing a great work, a work that is being carried forward all over the world at the present time. Just as he says, the whole world is waking up to it; the journals are filled with it, and everyone at the present time seems attracted toward this great movement.

Dr. Corley (closing the discussion). I had hoped by this paper to help us to realize how little progress we are making. We are in the habit of standing on the floors of our associations and throwing bouquets at ourselves and talking of the marvelous strides of the profession. We do not think of the other side, and how little we have done and how much more we might have done. Gentlemen, we are nothing better than mechanics and artizans! Why in the name of decency and consistency do we want to be called doctors? I should like to know why we are entitled to this degree as long as we pull out teeth. There are five bushels of teeth in my exhibit, which were extracted, some of them at least, by the best men in the profession. More is the pity! Why is this done? Because we are cowards. Let us wake up, and do something worthy of a *doctor*. We are just postponing the millennium, and God himself cannot bring it about until we help Him. We are His instruments, and He cannot do good work with poor instruments, with all His infinite power.

The meeting then adjourned until the afternoon session.

(To be continued.)

DENTAL SOCIETY OF THE STATE OF NEW YORK.

Forty-third Annual Meeting.

(Continued from page 112.)

THE CLINICS.

FRIDAY, MAY 5TH.

Dr. F. H. **SKINNER**, Chicago, Ill. "Pyorrhea."

Dr. Skinner treated an upper first bicuspid for pyorrhea. On the distal side of this tooth was found a large pocket extending well up over the bifurcation and almost to the apex of the lingual root. With the Carr scalers, which act by planing instead of by scraping, the clinician removed the deposit, as well as all dead periosteum, from the portion of the root covered by unattached gum tissue. Those portions of a root of a vital tooth which will not eventually become covered by gum tissue, especially at the neck of the tooth, should be planed just sufficiently to remove the calcic deposit and to leave the surface smooth, because the removal of too much tooth substance would leave such a tooth hypersensitive for a long time. Pyorrhea in the case treated was caused most likely by malocclusion, and unless this condition be corrected, the clinician would not expect a permanent cure.

The C. M. Carr Club, Buffalo. "The Treatment of Pyorrhea." Drs. L. **MEISBURGER**, S. **ESCHELMAN**, A. F. **ISHAM**, A. E. **MIMMACK**, J. H. **HOOD**, T. C. **PHILLIPS**, J. O. **MCCALL**, and R. R. **JOHNSTON**.

These members of the Carr Club of Buffalo individually treated cases of pyorrhea in its various stages, and demonstrated the effectiveness of the Carr instruments in these operations. Thorough instrumentation and surgical treatment as opposed to medication represent the basis of this work.

Dr. M. L. **RHEIN**, New York. "Diagnosis and Prognosis of Peridental Diseases."

Dr. A. G. **LANSING**, New York. "Obtunding Sensitive Erosions Permanently."

The clinician treated four patients for sensitive erosions by the application of 40 per cent. formalin, touching the sensitive areas with a small pellet of cotton slightly moistened with formalin, then applying hot air with the formalin, and afterward hot air alone. This treatment was repeated from six to twenty times. One of the cases treated required twelve minutes to produce satisfactory results, another, only four minutes, and two cases, six minutes each.

Dr. F. L. **STANTON**, New York. "Retention in Cases of Class II, Division 1 (Angle Classification) Before the Eruption of Bicuspids."

Dr. L. M. **HOMBURGER**, New York. "Porcelain."

Dr. M. I. **SCHAMBERG**, New York. "Oral Surgery."

Dr. R. G. **HUTCHINSON, JR.**, New York. "Diagnosis and Prognosis of Different Types and Phases of Pyorrhea Alveolaris."

Dr. Hutchinson examined several cases of pyorrhea, and called special attention to the fact that it is most important to discover just what factors have contributed to cause the condition in each individual case. The clinician claimed that instrumentation alone, no matter how perfect, would not establish and maintain a cure. Malocclusion caused by loss of teeth must be corrected. Improperly constructed crowns and bridges must be removed and replaced by such as are more perfectly constructed, and, in short, any condition which injures the tissues or makes sanitation impossible must be corrected. This must be followed by proper care on the part of the patient, and success will surely result.

Dr. Robert Purvis, Camden, N. J. "Extraction and Minor Surgical Operations."

Dr. Purvis administered somnoform to a patient and extracted three molar roots. The clinician also extracted two teeth by the aid of a local anesthetic.

Dr. R. Ottolengui, New York. "Technique of Taking Impressions and Avoiding Gagging."

Dr. Oscar Carrabine, New York. "Orthodontia."

The clinician exhibited a patient under treatment for a class III case of orthodontia, in which Dr. Angle's appliances were being used. This work, from the beginning, was done this year in the Orthodontia section of the First District Dental Society of the State of New York.

Dr. G. E. Fletcher, Albany. "Orthodontia. Special Working Retainers."

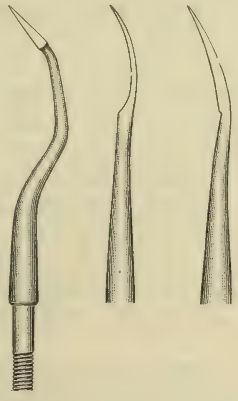
Dr. W. C. Fisher, New York. "A Simple and Effective Method of Polishing the Necks of Teeth in Pyorrhea and Prophylactic Work."

Dr. C. F. C. Mehlig, New York. "Gold Inlays."

Dr. E. B. Prentiss, New York. "Plaster Dies for Porcelain Inlays."

The clinician showed a method of hardening plaster models made from modeling-compound impressions. The models are thoroughly dried out on a wire gauze frame over a Bunsen burner. They are then placed in a pot of stearin over a water-bath to prevent burning and consequent discoloration. The stearin is melted over the models, which are allowed to remain therein for about two minutes, after having been thoroughly immersed. The models are then removed and quickly hardened with compressed air to drive off any particle of stearin from the interior of the cavity. They are thus made very hard and suitable for the burnishing on them of such gold matrices as are used for Jenkins' porcelain. Several of these dies were exhibited which had been used in practical cases, and in each case the margins of the cavities were in excellent condition.

Dr. G. F. Eames, Boston, Mass. "Pyorrhea Treatment with Instruments of the Clinician's Own Design."



Dr. Eames' clinic consisted mainly in the demonstration of the use of instruments designed and improved by him. Their distinctive merit, he claimed, lies in their adaptability to different methods of use, each instrument having four cutting edges and a point, and by its shape suggesting its special purpose. Attention was called to the fact that the shape of the instrument, in its broad sweep over the root of the tooth, permits the operator to detect and remove a minute but tenacious particle of deposit which would otherwise be overlooked in using an instrument which covers only a very small area of the root surface. When a particle of deposit is thus found, the point of the instrument may be used if necessary, to detach it, and the deposit then removed by one of the four cutting edges of the instrument. The clinician claimed that by the aid of these instruments very small deposits can be detected and removed with ordinary skill, or at least with less skill than is required when the operator uses instruments which cover a comparatively small area. With such advantages it is evident that a thorough operation can be performed in a shorter time and with less discomfort to the patient than by the usual means. Furthermore, in the depth of a pyorrhea pocket, from which the operator desires to remove every particle of foreign matter, the point and curve of the instrument renders it possible to get behind or beyond such débris and remove it, instead of forcing it into healthy tissue where it would be liable to spread infection.

Dr. MORTON VANLOAN, Albany. "Obturator Plate."

Dr. L. C. LEROY, New York. "Treatment of Pyorrhea, Showing a New Set of Instruments for this Purpose."

Dr. J. H. DOWER, Syracuse. "The Insertion of Soft Foil Gold Fillings."

Dr. A. MCALPIN, Bradford, Pa. "Schoenbeck's Silicate Cement."

Dr. McAlpin demonstrated the use of silicate cement in restoring contours, and also a method of securing the fillings by the use of anchor screws.

Dr. W. A. HECKARD, New York. "Cusp-carving Instrument for Taggart Inlay Models."

Dr. W. M. STANBROUGH, Newburgh. "Combination Fillings of Cement and Gold."

Dr. W. S. TELLER, Newburgh. "A Safe Method of Backing Facings."

Dr. C. C. BIRDSALL, Central Valley. "A Method of Substantially Repairing Lower Vulcanite Plates."

Two broken lower plates were shown on models prepared and ready for packing the rubber to make the repairs. The first plate, broken near the median line, was prepared by cutting a V-shaped opening, with its apex brought to a feather-edge on the labial surface, the fresh surface being roughened by an engine bur. This method affords a large surface for the adherence of new rubber, and provides for a broad piece of new rubber at the weakest point.

The second plate was a partial one, carrying two molars on each side, the connecting bar of rubber having been broken. Here the old rubber was cut away under the molars and practically a new bar was made.

Dr. H. C. BENNETT, Newburgh. "A Method of Making Seamless Open-face Crowns."

Dr. A. W. TWIGGER, Ossining. "Porcelain-faced Crowns."

The clinician claimed that the value of this crown lies in its adaptability to teeth too badly broken down to be filled permanently, or to teeth of such a character that filling is impracticable except as a temporary measure, but in which the conditions are not such as to warrant the use of one of the post crowns. The tooth to be crowned is first ground to a conical shape, grinding a trifle more on the labial than on the lingual surface. A ferrule of No. 34 gage platinum plate is then fitted to the tooth and soldered with pure gold, leaving the cutting edge open. On the surface of the ferrule is baked a veneer of porcelain in combination with a pin facing to supply that portion of the natural tooth which has been ground away. After obtaining a satisfactory facing, some porcelain is placed on the face of the platinum, allowing it to fill at the same time the open end of the ferrule; the veneer is placed on the layer of porcelain, and then removed from the tooth, and the porcelain is baked. If one prefers to divide the work into two sittings, the ferrule may be fitted, the impression taken, and the facing fitted to the platinum on the plaster cast.

If a pin tooth is used as the veneer, a facing of a darker shade than the natural tooth should be selected, as the grinding away of so much of the body of the facing makes a little difference in the shade. The clinician has had best success with Jenkins' prosthetic porcelain, which adheres very securely to the platinum, but any high-fusing porcelain may be used.

Dr. A. E. Preston, Delevan. (1) "Separation by Sea-tangle Tent."

In discussing the subject of separation some time ago at a gathering of dentists, the clinician found that many of them knew nothing about the use of sea-tangle for separating teeth. Many times mechanical separation is objected to by both patient and operator, and most of the materials used for slow separation have some objectionable features. Gutta-percha and rubber creep out of place and often injure the gum margins; cotton is uncleanly and otherwise undesirable Sea-tangle is perfectly cleanly, retains its position in the cavity, and is more rapid in its action than cotton. In using this material care should be taken to fit a piece as nearly of the shape of the retention cavity as possible. The amount of expansion is controlled by the size of the piece used and the closeness of the fit. After the tent is in place the patient is dismissed for twenty-four hours or more if desired. The packing will keep clean for weeks.

(2) "Lining Deep-seated Cavities in Teeth with Vital Pulps."

This method is new only in one respect, namely, that of allaying the irritation always caused by the use of zinc oxychlorid. The clinician has tried various sedative preparations as well as the essential oils, only to be troubled in many cases by very severe after-pain. Lately he has been using Phenandyne with marked success, after the following method: On a mixing slab a small quantity of Flagg's oxychlorid of zinc powder and enough of the liquid to make a thick paste are placed. Before mixing, to the liquid a small drop of Phenandyne is added; the powder is drawn into the liquid, the paste carried to the cavity, and pressed home with a pledget of cotton. After about fifteen minutes the cavity will be ready for the permanent filling.

Dr. E. A. Schillinger, Lee, Mass. "Partial Lower Denture, Showing Each Step in Construction where Crowns, Clasps, Gold Bar, and Waxable Rubber are Used."

The first step in the construction of this kind of denture consists in making the gold crowns for the remaining bicuspids, the cusps being cast in the usual way, after a dovetail or slot has been cut in the wax to receive a lug. An impression is then taken as for a bridge, the crowns coming off in the plaster. A plaster cast is then made, clasps are constructed to fit the crowns, and a lug is made to fit into the dovetail and fastened to the clasp. The clasps in turn are attached to the bar, which runs back of the natural teeth, and fastened in the rubber by small metal posts. The chief reason for using waxable rubber in cases of this kind is that it can be vulcanized without separating the flask.

Dr. Milo Hellman, New York. "Some Extremely Developed Cases of Malocclusion."

Dr. G. B. Palmer, New York. "Cast Gold Inlays by the Stone Model Method."

Dr. L. E. Palmer, New York. "Various Crowns with Reference to Esthetic and Resistive Principles."

This clinic consisted in an exhibition of several different crowns, the clinician aiming to combine a maximum of efficiency with harmonious appearance. The following pieces were shown: A gold shell crown with cast top; a Spaulding all-porcelain jacket crown; a detached-post crown, set in a "basket," and attached to a base such as is used for a Richmond crown; a crown attached to a cast base—Taggart method—and a crown attached to a cast base with a lingual step, giving in effect a half-band.

Dr. V. H. Jackson, New York. "Orthodontia."

Dr. A. H. Merritt, New York. "Cavity Varnish for the Prevention of Thermal Shock."

One dram of gum dammar is heated until it is entirely liquid; an equal amount of commercial oxid of zinc is added, and thoroughly incorporated by stirring. The mixture is transferred to a convenient receptacle and allowed to cool, the result being a white resinous mass, soluble only in chloroform. For use, a pledget of cotton is saturated with chloroform, rubbed upon the resinous mass thus formed until saturated, and carefully applied as a varnish to the prepared cavity. After evaporation of the chloroform a thin white coating is left over the surface of the entire cavity. The thickness of this layer can be increased by a second application.

The cavity margins should then be cleaned, after which the operator may proceed with the filling as usual. As a protection against thermal shock this preparation is invaluable, and unless the pulp has undergone degenerative changes, it is well-nigh infallible. A tooth so sensitive to temperature changes as to be exquisitely painful upon the use of the chip-blower will in most instances be wholly insensible to its use after one application of this varnish, which has a wide field of usefulness wherever metal or silicate cements are used. It is also useful in preventing irritation of the dentin by the phosphoric acid employed in oxyphosphate of copper and zinc fillings. Its slightly sticky quality is often useful in starting gold foil fillings. The formula, with slight modification, was given to the clinician by Dr. W. S. Waterbury of New York, and has been in constant use for more than ten years with increasing success.

Dr. C. W. B. Wheeler, New York. "Orthodontia."

This clinic consisted of an exhibition of the different forms of Jackson appliances applicable to the different classes of malocclusion, and the materials and tools used in their construction. The clinician also showed the construction of these appliances when made of precious metals.

Dr. Edward B. Niles, Boston, Mass. "Permanent Antiseptic Filling."

Dr. W. H. Leak, Watertown. "Amobilis."

The clinician claimed that the material which could best be placed in root-canals must be in paste form when introduced, and in addition, since there is moisture in the tooth structure, the material must not be impermeable to moisture, else it will not have capillary attraction for the tooth; also it should be hygroscopic, that is, have an affinity for moisture, so that it may have a strong capillary affinity for the canals and tubuli. This was demonstrated by filling root-canals with Amobilis, showing its affinity for the root-canals and its ease of introduction.

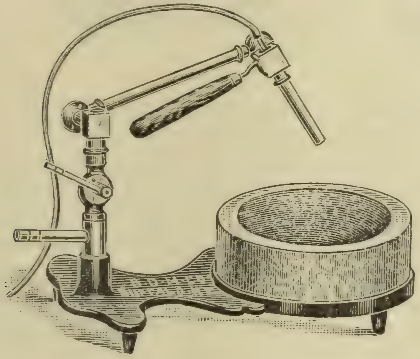
The clinician further claimed that the root-canal filling material should be solid when in place, and should possess antiseptic and mummifying properties, which properties, he stated, are possessed by Amobilis.

Amobilis was dissolved in water to show how easily it could be removed from the canal in case of necessity, which the clinician stated to be a very desirable property.

Dr. H. A. Pullen, Buffalo. "Orthodontia Soldering Stand."

This clinic consisted in the exhibition of an orthodontia soldering stand. The stand represents a combination of a hinged orthodontia blowpipe and a soldering block, and is intended especially for soldering appliances upon casts.

The clinician claimed the following advantages for the soldering stand: (1) By means of the hinged portions of the blowpipe, the flame may be directed upon any portion of the inner circumference of the soldering block, and may be adjusted so that it will remain in any position to which it is moved. This allows the operator to pick up solder and adjust the parts of the appliance while the flame of the blowpipe is firmly held in the exact position desired. (2) The soldering block may also be moved in a circle within its own circumference, thus doing away with the otherwise necessary changing of position of a heated plaster case. (3) The blowpipe may be manipulated with the left hand if desired, leaving the right hand free for picking up solder, etc.



Dr. E. R. Neff, Carthage. "A Casting Method for Restoring Broken Bicuspids."

Dr. B. T. Mason, Fulton. "Soldering Without a Blowpipe."

The clinician demonstrated a very convenient and non-checking method of soldering Richmond crowns and small bridges without the use of a blowpipe, by confining the heat of a Bunsen burner with a cone of sheet asbestos. The investment is first dried out, the solder placed in position, and a Bunsen flame directed on the under surface of the investment. A cone is then made of two thicknesses of sheet asbestos, the diameter of the cone being one inch larger at the base than at the top, or 2½" by 1½". The cone is then placed over the investment and the heat gradually increased. In this manner the heat is confined as in a furnace, and will readily melt the solder.

Dr. W. S. Rose, Schenectady. "Some Hints on Metal Work."

(1) By making the band of a shell crown of 23½-karat gold and fusing thereon a partial band of 22-karat gold, an abutment shell crown may be so strengthened that there will be no danger of subsequent tearing under the stress of mastication.

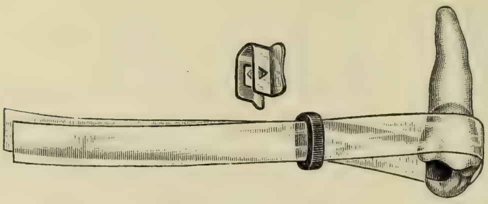
(2) If the cusps are cast, the same strength can be secured by bringing the cast gold over upon the band and soldering with 22-karat solder.

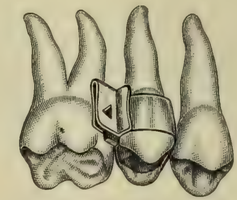
(3) To make a thin wax model for casting dentures, a piece of base-plate wax is rolled to the thinness desired of the plate, and after slightly warming is adapted to the plaster model by pressing with moldine, protecting the wax by a piece of moistened rubber dam.

Dr. C. A. Hodder, Canajoharie. "Removable Bridge."

Dr. G. H. Shannon, Cambridge, N. Y. "Celluloid Band and Matrix Clamp."

Dr. Shannon demonstrated the use of a celluloid band matrix with clamp as follows: A celluloid strip, five inches long and one-quarter inch wide, is folded to make a loop. A small rubber ring is slipped over the ends of the band and slid up until the loop of the band is of such a size as to easily pass over the tooth to be operated upon, after which the band is adjusted to the tooth. A specially designed clamp is then affixed to the band, holding it tightly, and the ends of the band are clipped off close to the tooth. The clamp, being small, offers no obstruction to the operator, and the operator can easily take a wax impression or pattern for an inlay. The wax is confined to the cavity and excluded from the interproximal spaces. The bite is then taken, and the carving completed with the matrix *in situ*. With the aid of the celluloid band and matrix clamp, the clinician claimed that oxyphosphate or silicate cements can be very easily used as filling materials, producing more highly polished and denser surfaces than are obtained by other methods.





Dr. F. R. Getz, New York. "Removable Bridge Work and Interdental Supports."

Dr. Getz exhibited three types of removable bridges, together with several forms of attachments for special cases, all of these being duplicates of bridges and attachments used in practical cases. These bridges showed the desirability and the many advantages of the removable over the fixed type of bridges. The clinician also exhibited several types of appliances for uniting and strengthening loosened pyorrheal teeth, these also being duplicates of appliances used in practical cases.

Dr. C. F. Kemple, New York. "Appliance for Moving Incisors."

Dr. S. DeSola, New York. "Removable Bridge."

Dr. J. G. Roberts, Buffalo. "Prosthetic Appliances."

Dr. G. M. Hughey, Buffalo. "Cast Attachments."

Dr. L. S. Ingalls, Cortland. (1) "Backing a Porcelain Facing with Platinum and Tipping with Gold Without Heating the Facing."

First, a double bevel is made on the back of the facing near the incisal edge so that the second bevel forms nearly a right angle with the long axis of the facing, thereby doing away with the sharp, thin edge of the facing at the incisal edge. The facing is then backed with 36-gage soft platinum, allowing the platinum to extend slightly over the incisal edge, punching the holes for the pins with a sharp instrument instead of using the plate punch. The platinum backing is then removed and invested with the side that fits next to the porcelain down, slightly forcing the backing into the investment so as to force the investment through the pinholes, thereby making a sort of dummy pins of the investment material; these dummy pins are made to be held more firmly by the ragged edge obtained in the backing by punching the holes with an instrument. This prevents filling of the pinholes when gold is flowed over the platinum. The investment is then trimmed away at the incisal edge as far as the edge of the platinum backing or slightly below it, and to this is fitted a piece of pure or 22-karat gold plate about $\frac{3}{8}$ or $\frac{3}{16}$ of an inch wide, and 26 or 28 gage, to the incisal edge of the platinum. This gold is then removed and pure gold flowed over the platinum backing and nearly to the incisal edge. The fitted piece of gold is then put in place and joined to the backing with 20-karat solder, allowing the solder to become flush with the gold just previously melted on. The investment is then removed, when a platinum backing will have been obtained reinforced with pure gold and tipped with 22- or 24-karat gold. The backing is now replaced on the facing, and the pins are riveted, first placing the facing face down in warm dental lac or sealing wax, which is afterward chilled. This forms a seat for the porcelain so that in the riveting process the force will be more evenly distributed over the facing, thereby preventing fracture of the latter. After attaching the facing to a crown cap or a bridge, the incisal edge is finished by grinding toward the labial surface, thereby drawing or forcing a thin edge of gold over the incisal edge of the facing.

The clinician claimed that the advantage of this backing consists in the platinum producing a shading of the porcelain, which is sometimes desired, in the production of a gold tip without heating the facing, and in there being no danger of its melting down during the process of making.

Another method of obtaining this result consists in flowing wax over the platinum backing after it is fitted to the facing, removing and investing it as in casting an inlay, and casting the gold to the platinum.

(2) "Mending Broken Plaster Casts."

To mend a broken plaster cast, liquid court-plaster or "newskin" can be used. If a fresh cast is fractured, before applying the court-plaster the broken parts are dried slightly by holding them over a flame. In this way a strong repair is obtained, which will withstand hot water.

Dr. E. A. Davis, Boston, Mass. "A Unique Method of Supplying a Missing Anterior Tooth."

Dr. C. F. Ash, New York. "Removable Bridge Work."

Dr. J. Lowe Young, New York. "Models Made Before and After Treatment to Prove that Extraction for the Correction of Malocclusion is Unnecessary."

To many the title of this clinic may seem strange, but when it is realized that the extracting specialists are removing sound bicuspids by the hundreds in patients referred to them by general practitioners who believe extraction to be necessary for the correction of malocclusion, the reason for this clinic becomes evident.

Models of a number of cases taken before and after treatment were exhibited, several of them showing sufficient enlargement of both the upper and lower dental arches to accommodate two teeth —bicuspid and canine. One case showed an increase of width in the upper first molar region of 0.42 of an inch. When, by the proper application of gentle pressure, the tissues can be stimulated in these extreme cases so as to bring about bone development to such an extent as stated above, it would seem that extraction of teeth for the correction of malocclusion is no longer necessary.

Dr. A. J. Quimby, New York. "Clinical Demonstration of Taking and Developing X-ray Pictures of the Teeth, etc."

Observations in radiography work extending over a number of years suggested to the clinician the need of practical demonstrations for teaching the profession the efficiency and harmlessness of the X ray in diagnosis. This clinic was proposed as the best method to attain that end. It consisted of the exhibition of a number of X-ray pictures taken for the purpose of general diagnosis, special attention being given to radiographs of the teeth and nasal sinuses. A complete portable X-ray outfit, specially constructed for work outside of the laboratory, was set up, and radiographs of teeth were taken in a number of subjects. These radiographs comprised one case of impacted third molar, one case of congenital absence of the third molars, one case of delayed dentition, one case of congenital absence of the first molar, two cases of concealed abscess, and two cases of suspected retention of broken broach tips. In some of these cases the X-ray plates alone were used, while in others both the plate and the X-ray dental film were used, depending on the indications presented. The pictures were then developed and were interpreted during the clinic.

SATURDAY, MAY 6TH.

Dr. Richard Blum, New York. "New Attachment for Removable Bridge Work."

Dr. H. E. S. Chayes, New York. "Crown and Bridge Work."

Dr. S. G. Perry, New York. "All-Porcelain Crowns Adapted to the Casting Process."

Dr. F. S. Ford, Cazenovia. "Cast Porcelain-faced Crown."

The root is prepared in the same manner as for a Richmond crown. The tooth selected for the facing is ground to the root in the mouth, and backed with pure gold. The post is placed in position, and soft inlay wax is forced over the end of the root and the patient instructed to bite, in order to secure correct articulation. The facing is set in the wax in its proper position and the whole piece removed and invested in the casting ring. If the wax is carried up slightly under the gum, which may be accomplished with an amalgam burnisher, the casting will produce a crown superior to a Richmond crown, for the reason that the gold will accurately fit the end of the root and will cause no irritation of the soft tissues. This crown, the clinician claimed, could be made in about half the time that is required for a Richmond crown.

Dr. A. V. Needham, Oneida. "An Application of the Ball-and-Socket Principle to Partial Dentures."

Dr. G. W. Pringle, Niagara Falls. "Some of the Practical Uses of the Case Abrasive Disk."

This clinic consisted in a demonstration of how any surface of any tooth in the mouth can be cut and polished, or any teeth can be separated and one tooth be ground without danger of injury to the adjacent tooth, by the use of the Case abrasive separating disk, which is made of thin steel, and one side of which bears electrolytically incorporated Alundum.

Dr. Sinclair Tousey, New York. "X-ray Diagnosis in Dentistry."

This clinic consisted in the exhibition and explanation of three hundred dental radiographs illustrating cases of pyorrhea with pockets and absorption of the alveolar process which have been successfully treated by the X ray and the ultraviolet ray. Cases of examination for unerupted teeth were also exhibited, some of the radiographs showing these teeth to be present in their normal positions, but requiring separation to permit of their eruption. In one case a persistent deciduous canine was securely wedged in by the erupting permanent canine, thereby effectually blocking the eruption of the latter. The cases show that the absorption of the root of the deciduous tooth is part of the life-history of that tooth, and not necessarily associated with pressure from the erupting permanent tooth. Some of the pictures showed loss of the deciduous canine with absence of the permanent tooth, others having the permanent tooth in malposition far from the root of the deciduous tooth. Cases of necrosis, alveolar abscess, fracture of the alveolar process and of roots of teeth were illustrated, also cases where caries of the root or even of the crown was first revealed by the X ray. The latter included a lower canine having an extensive area of decay from contact with the clamp of a removable artificial tooth. Conditions of the antrum and also of root-fillings were shown in other pictures.

Dr. G. B. Parker, Watertown. "Method of Filling Root-canals."

First, easy access is obtained to the canals by using a large round bur. Then the canals are cleaned and enlarged well with Kerr reamers in the dental engine. The straight handpiece and reamer are used in upper anterior teeth, and the Davis or right-angle handpiece in posterior upper and all the lower teeth. The canals are wiped with alcohol and thoroughly dried with a hot-air syringe, applying a compressed-air pressure of about thirty pounds. The material for filling the canals consists of the following ingredients: Equal parts of Flagg's oxychlorid of zinc powder and liquid and a small drop of equal parts of tricresol and formalin (40 per cent.). These ingredients are mixed and carried to place on a pellet of cotton in posterior teeth, pressed to place with temporary stopping, and covered with cement. In anterior teeth gutta-percha points are used together with the same mixture.

Dr. F. A. GOUGH, Brooklyn. "Orthodontia."

Dr. F. H. NIES, Brooklyn. "Improved Porcelain Inlay with Minimized Cement Line."

Dr. C. P. RUYL, East New York. "Artistic Plate and Bridge Work."

Dr. F. S. WELDEN, Brooklyn. "Casting Porcelain."

The clinician demonstrated the use of a compound of silicates in such proportions as to imitate the color and texture of the human tooth, fusing at the fusing-point of gold, and capable of being cast in replica of any wax pattern, as in casting gold. Inlays cast of this casting porcelain, the clinician claimed, are strong and insoluble, and their contraction, if they are cast over a vacuum, is not apparent.

Dr. C. H. BARNES, Syracuse, "Gutta-percha and Temporary Stopping."

Dr. A. D. WELLS, Skaneateles. "A Two-piece Articulated Crown Made in Fifteen Minutes."

Dr. I. J. COE, Baldwinsville. "A Dental Record Code."

Dr. R. C. TURNER, Oswego. "Practical Suggestions."

Dr. E. R. WHITE, Syracuse. "Porcelain-faced Bicuspid Gold Crowns."

Dr. ROBERT MURRAY, Buffalo. "A Cast Wing Bridge."

Dr. C. K. BUELL, Buffalo. "Making Porcelain Facings for Special Cases."

Dr. C. M. RYAN, Syracuse. "Refining Scrap Gold."

Dr. W. H. ELLIS, Buffalo. "Orthodontia."

C. J. IMPERATORI, M.D., and SAMUEL GOLDSTEIN, M.D., New York. "Anatomical and Surgical Demonstrations upon the Skull." (*a*) Modified Kilian Operation for Frontal Sinusitis and Ethmoiditis. (*b*) Opening of Sphenoidal Sinuses. (*c*) Intra-nasal and Alveolar Operations upon the Antrum of Highmore.

Dr. J. H. BEEBEE, Rochester. "Combination Electric, Gas-and-Nitrous-Oxid, and Gas-and-Air Casting Machines, with No Air or Steam Reservoir."

Dr. O. W. NORTON, Rochester. "Contour Gold Inlay Retention."

The clinician demonstrated a method of using a platinum pin from an ordinary plate tooth for the retention of a gold inlay at the cutting edge of a central incisor. This method may be adapted to almost any condition, to suit the operator. The procedure was applied as follows: First, with a No. 1 bur, a hole is drilled, into which the platinum pin is placed, the head extending outward. An impression is then taken in the usual manner, when the pin comes away with the wax model. The wax model is invested and cast in the usual manner, and when seating the inlay the hole is drilled out with a No. 2 bur, thus enlarging it so that the cement will be allowed to come out freely.

Dr. C. F. BUCKLAND, Corning. "Method of Tipping a Facing Without Investing."

Dr. W. A. WHITE, Phelps. "A Valuable Method of Capping Pulps."

Dr. ALICE M. STEEVES, Boston, Mass. "Oral Hygiene."

This clinic consisted in the exhibition of a group of six models showing irregular and carious teeth of a type common among all children, especially those living in the congested districts of large cities. When faulty occlusion or caries renders the mastication of proteids impossible, the process of digestion is prolonged and auto-intoxication is induced, producing intestinal indigestion. Another point to be noted is that the mouth is kept in a constant state of fermentation, owing to the continual munching of starchy, milky, sweet substances such as crackers, glucose, candy, ice-cream, etc. This yeast-like condition of the mouth keeps up a constant irritation of the mucous membrane, and an inflammation is produced, varying in intensity from redness of the gums to pus-oozing from around the teeth. In many cases true pyorrhea without calculus is present. This condition of the mouth and digestive tract, together with faulty ventilation, will cause malnutrition, even when plenty of wholesome food is ingested. The most direct remedy consists in educating the parents to an appreciation of the necessity of modern dentistry and ventilation, and of the dental care of the children.

Dr. GEORGE VAN DER POOL, Albany. "Extraction of Lower Third Molars."

This clinic consisted of a talk, illustrated by models, on extraction of lower third molars when the second molars are in position.

Dr. H. J. KAUFFER, New York. (1) "The Use of Hyperemia Induced by Suction Plates to Promote More Favorable Prognostications for Staphylorrhaphy."

The clinician showed a plate constructed in two parts and connected by a hinge in its posterior portion, for producing hyperemia. When in place the upper plate rests on the floor of the nose and closes the nasal cleft, the lower plate covering the roof of the mouth. The plate is held in position by clasps on the teeth best adapted to support the apparatus. All edges of the cleft must be covered by the plate, but great care should be taken not to bring pressure to bear on the soft tissue. The space between the two plates represents the cleft, and in the act of swallowing suction is produced in this chamber. The patient is instructed to assist this by continually sucking, thus producing hyperemia. The clinician does not claim to approximate the edges of the cleft by this method, but the hyperemia increases the vascularity of the tissue, which is an important factor in cleft-palate operations, as the large percentage of failures is due to poorly nourished tissue.

(2) "Some Original Ideas on Interdental Splints."

The clinician presented a cap splint made as follows: A piece of thin sheet lead is pressed over the teeth, and this sheet is reinforced by flowing over it soft lead solder in which a piece of stiff wire has been embedded. The splint exhibited was made by the clinician in fifteen minutes.

Dr. J. F. CARROLL, Syracuse. "A Short Cut."

Dr. G. R. DANFORTH, Watertown. "Celluloid Matrix."

Dr. W. H. MITCHELL, Bayonne, N. J. "A Flexible Lower Denture."

This clinic consisted in the exhibition of a lower rubber plate of novel construction, the object of which was primarily to prevent tilting. This plate was used by the clinician in special cases where plates, as ordinarily made, give trouble to the patient. When teeth have been lost at different periods and the gum tissue is firm in one portion of the mouth and soft in others, this plate has been found to be very comfortable for the patient.

The method of construction is as follows: A plate is constructed as ordinarily, and afterward sawed in two at the borderline between the soft and hard gum tissues, care being taken to retain a cast of the finished plate. The slit is then slightly roughened with a file, and the plate invested on the lingual surface. A square box is then burred out so as to allow the insertion of a wire-made hinge, which binds the parts together and prevents lateral motion. The end of the wire hinge is packed, and the slot alone packed with velum rubber to allow a slight motion at these points. In use in mastication, when the patient bites, the plate is simply seated more firmly at that point, leaving two-thirds of the plate in regular occlusion. In a number of practical cases treated during a period of over six years, the clinician claimed that he had had success with these plates, after having had failure with the technique usually followed in making plates.

Dr. W. S. PAYSON, Castine, Me. "An Anchorage."

The clinician demonstrated a method of anchoring alloy fillings in badly carious teeth, conserving a maximum of tooth tissue by extending the filling into a sulcus, which after the carious portion is removed is cut out just sufficiently to contain a double-headed rivet surrounded by the alloy. The rivet, acting like the steel rods in reinforced concrete, with one head in the filling and the other in the distal end of the sulcus opposite the filling, makes a very firm and reliable anchorage.

Dr. M. E. MERKER, New York. "Universal Interchangeable Tooth."

THE DENTAL COSMOS

A MONTHLY RECORD OF DENTAL SCIENCE.

Devoted to the Interests of the Profession.

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PHILADELPHIA, FEBRUARY 1912.

EDITORIAL DEPARTMENT.

"PROVINCIALISM."

This term has been defined to mean a certain narrowness or localism of thought and interest characteristic of the inhabitants of a province as distinguished from the metropolis, or of smaller cities and towns as distinguished from the larger. It is an attitude or state of mind which most people recognize very easily in others, but with more difficulty in themselves; albeit there are a few rare cases where the possessors of this defect are aware of their own provincialism, under which circumstances the difficulty is usually self-curable. It is a disorder which in certain forms affects individuals as well as communities, and evidences of its existence may be found in groups of individuals of all magnitudes, from the country village or hamlet to the largest municipalities, states, or even nations. It is some more or less pronounced provincialism that often constitutes what is regarded as the prime characteristic of an individual or group or community; and as the various social divisions of humanity manifest provincial characteristics, so do professional groups. The differences which are designated as provincialisms mainly owe their origin to lack of knowledge upon the part of those who manifest them concerning the order of things which characterizes the activities of other individuals and social groups of humanity. At the foundation it is a condition which is begotten of ignorance of a certain order of facts relating to the rest of humanity—a kind of ignorance which it is the function of that harmonizing and unifying process known as civilization to eliminate.

It is a trite saying that history repeats itself; but why should history repeat itself? Is it not indicative of a tremendous waste of time and energy that it should be necessary for history to repeat itself? Would it not be a masterstroke of conservation if effective means could be devised whereby it would become possible to let past history remain of record and devote our entire energies to making new history?

Two decades of supervision of this journal has brought under editorial consideration unnumbered instances of the kind of dental professional provincialism that enforces the truth of the axiom that history repeats itself. It would be difficult to estimate the number of times that the device of adapting porcelain crowns to root-ends by means of the casting process has been invented, described, and submitted for publication to this magazine. There can be no doubt of the honest belief of each inventor in the originality of his device, and each was disappointed to discover that there is a large difference between originality on the one hand and priority of originality on the other. The same experience has occurred not only with numerous other devices but with many suggestions and ideas relating to dental practice and dental policy.

The writer once invented a device having relation to the firing of high explosives, and which seemed to his at that time youthful imagination to promise such effectiveness as to portend the disarmament of nations and the dawn of universal peace, with the incidental material benefit of much wealth and honor to the inventor, when the device should be ultimately launched before the gaze of an appreciative and expectant world. A preliminary search through the Patent Office records revealed the disquieting fact that the invention had already been covered and safeguarded round and about by some seventeen letters patent to as many individuals. From which experience the useful moral lesson was derived that it is not only worth while but in most cases vitally important to discover the existing state of the art before announcing an original discovery—or, as expressed in a well-known legal axiom, "Know all the law on the subject before trying the case in court."

An observance of the principle thus described would avoid much useless repetition in our literature and the immense loss of time upon the part of readers in sifting out the new wheat from the old chaff, and would incidentally prevent many instances of irritation and disturbed equanimity upon the part of those who suddenly discover that certain of the most attractive-looking children of their brain have had a previous parentage.

There is also the broader national sense in which we exhibit not a little of the factor of provincialism in common with the dental profession in all other nations. We have been working out our own salvation in dental matters with our attention concentrated so closely upon the conditions of our immediate environment for such a length of time that we have not kept sufficiently in touch with what has been going on elsewhere beyond our national borders.

Dentistry today is a world problem. No period of its history has witnessed such an awakening everywhere to the importance of dental possibilities. The activities of our profession in all countries have become energized into greater effectiveness in taking advantage of the general demand for a larger dental service. This new vital force in dentistry needs organization and intelligent direction in order that it may be most effectively used in the interest of humanity. The first and fundamental effort that needs to be made is to put our professional house in order by harmonizing our many educational systems, by reorganizing the laws defining the conditions and limitations of dental practice in the several countries, and by getting together an international conference of leaders do all that can be done to intelligently eliminate the provincialisms that keep us apart and make of us a heterogeneous profession in the broad, cosmopolitan sense. The promise for the future of dentistry is full of hopefulness, but until we have eliminated, by the civilizing effect of contact with the world relationships of our calling, these provincial differences that make for misunderstanding, friction, and inharmony, we shall not have earned success, nor shall we otherwise attain to it.

A Correction.—In Dr. M. L. Rhein's paper entitled "Scientific Treatment of Root-canals" (see DENTAL COSMOS for September 1911) a typographic error appears on page 999, in the formula for a solution to be used after the application of Schreier's paste. The quantity of H_2O_2 should have been given as 2 ounces, not 1 ounce, the correct formula in full being—Mercuric bichlorid, 1¾ grains; Hydrogen peroxid (Marchand), 2 ounces.

BIBLIOGRAPHICAL.

A MANUAL OF DENTAL PROSTHETICS. By GEORGE H. WILSON, D.D.S., formerly Professor and Demonstrator of Prosthetics and Metallurgy, Dental Dep't, Western Reserve University, Cleveland, Ohio. Pp. 507, 12mo, with 396 illustrations. Cloth, $4.00 net. Philadelphia and New York: Lea & Febiger, 1911.

This, the first of a series of small textbooks upon the various branches of dental science and practice to be published by Lea & Febiger, is a real addition to the literature of dental prosthesis. The author, who has devoted the last fifteen years of his well-rounded professional career to the exclusive practice of dental prosthesis, has succeeded in producing a book which thoroughly well reflects the best thought on the subject of which it treats, as well as his own personality and his own system of practice—a dual accomplishment of rare occurrence. While the central idea has been to have the volume present dental prosthetic procedures in accord with the methods most approved by the workers and teachers in that field, the author's own methods have necessarily been given a just attention, and the work has the breadth of view characteristic of one familiar with the whole field, together with the pointed and single purpose of one presenting his own methods of practice.

The work covers the whole subject of prosthetics, and the matter of its text is arranged in a logical order. After a presentation of the form and functions of the mouth and its associated parts as a background for a study of the procedures by which lost tissues of this cavity are restored, chapters on Impressions, Casts, Occlusion and Contour Models, and Articulation and Antagonizers follow. The chapter on Impressions is particularly valuable, and, by virtue of describing the author's technique in careful detail, shows him to be a master in this important and difficult part of the work.

The author quotes extensively from Prof. A. Gysi upon the subject of articulators and articulation, which is the first excerpt from his very valuable treatise yet to appear in a text-book in English.

Dr. Wilson has enlarged upon the chapter of Vulcanite appearing in the "American Text-book of Prosthetic Dentistry" for the book under discussion, and it is probable that this last text is the most complete treatment of the subject extant at the present time. It is also probable that Dr. Wilson has done as much to bring the making of vulcanite dentures to its present degree of perfection as anyone now living. In the chapter on Retention the author has covered the subject very well, adding thereto some of his own ideas concerning clasps and their usage.

In the treatment of the setting of artificial teeth the author publishes his own method of providing the balancing effect of bilateral contact, the necessity of which was pointed out by Bonwill. The method proposed has the advantage of simplicity and ease of operation, and will doubtless be a useful expedient in many cases. The technique of aluminum, gold, tin, and continuous-gum dentures is included in the work—that of aluminum casting having been greatly developed in the past three years.

It is doubtful if the chapter on appliances for Cleft Palate is quite up to the standard of the other portions of the work, but this is rather from lack of breadth of treatment than from bad judgment in its recommendations. It is also to be regretted that the limitations of space prevented a fuller discussion of esthetics, particularly since many of the excellent illustrations portray the author's skill in this branch of facial restoration. The book is more a manual than an elaborate treatise, and as such it must be curtailed in some particulars.

The character of the illustrations, which are largely of photographic origin, does much to enhance the usefulness of the book as a teaching instrument, and this, together with the typographical excellence of the text, leaves little to be desired from the standpoint of bookmaking.

A MANUAL OF MENTAL SCIENCE. By LEANDER EDWARD WHIPPLE. New York: The American School of Metaphysics, 1911. $1.00.

Mr. Whipple's system is "Christian Science" with "Mental" substituted for "Christian," and all allusions to "our Mother" omitted. For those who like this kind of thing, this is the kind of thing they will like.

REVIEW OF CURRENT DENTAL LITERATURE.

[*Deutsche Zahnaerztliche Wochenschrift*, Berlin, 1911, No. 9.]

GUTTA-PERCHA AND ITS USE IN COMBINATION WITH VALIDOL CAMPHORATUM. BY DR. H. C. W. BOEDECKER.

Gutta-percha is used for permanent, temporary, or root-canal fillings in every dental office. For all these purposes gutta-percha can be worked much more easily and with greater success when employed in combination with validol camphoratum. Validol camphoratum is an oily liquid, consisting chiefly of valerian, menthol, and camphor, and can be obtained at most chemists; it is frequently used by the profession as a sedative. It has also been recommended by Professor Schroeder of Berlin in doses of eight drops on a lump of sugar for the suppression of the tendency to sickness during the taking of plaster impressions. The gutta-percha is heated as usual, and then dipped into validol before it is introduced into the cavity. The surface of the material is thereby dissolved, and forms an extremely plastic substance which adheres well to the walls of the cavity, even when they are still moist, while, on the other hand, it does not adhere to a lukewarm steel instrument. The gutta-percha also hardens more rapidly than when dissolved with chloroform. The filling is introduced under strong pressure with a large plugger heated and immersed in validol, and is smoothed by the same procedure. For temporary fillings Hill's stopping, consisting of a mixture of gutta-percha and wax, is similarly treated with validol. The cavity is dried superficially, the stopping softened, immersed in the validol, and then dipped into some antiseptic powder to prevent infection by any septic matter accidentally introduced from the gums. Validol not only facilitates the introduction of the filling, but also has a favorable action on an inflamed pulp and sensitive dentin. The latter property is especially valuable if teeth with sensitive approximal cavities have to be separated by means of gutta-percha. In making root-canal fillings, the canal is dried, then moistened with validol, and chloro-percha to which some validol has been added is introduced. A piece of gutta-percha, heated and dipped in validol, is then firmly pressed in by means of a fine plugger, which can readily be withdrawn without the gutta-percha sticking thereto. For setting crowns or orthodontia bands, red base-plate gutta-percha or Hill's stopping is softened on a water-bath warmer and mixed with validol until it can be worked into a mass of soft, pasty consistence.

For displacing hypertrophied gum tissue covering a root, without extensive destruction such as may be caused by surgical measures or electric cauterization, the root-canal is packed with a tricresol dressing sealed in with a small piece of heated temporary stopping dipped in validol and some antiseptic powder. A strong silk thread is then placed around the adjoining tooth on each side in the shape of a figure 8, tightened and well knotted. A larger quantity of stopping is then heated, dipped in validol, placed on the root and pressed into the desired shape. This "saddle" is renewed every time the root-canal dressing is renewed, and it will be found that before the root-canal treatment is completed the edges of the root are entirely free from impinging gum tissue. Once the crown is inserted the gum tissue quickly resumes its normal position and appearance. The object of this silk or wire loop is not only to anchor the gutta-percha, but also to prevent the displacement of the looped-in teeth in a mesial and distal direction.

In the case of incisors, a provisional peg tooth may be used in combination with the saddle. A short German silver peg is soldered to a suitable porcelain tooth. To this peg, just underneath the soldered part, the middle of the silk thread is fastened. The peg and back of the tooth is then plastered over with softened temporary stopping, previously immersed in validol, the tooth inserted and fastened with loops to the neighboring teeth. Any open places that may still be present can be filled up with gutta-percha and validol. Camphorated validol allows not only of easy working and perfect smoothing, but possesses antiseptic properties and acts as a sedative on the pulp. The camphorated validol is to be preferred to the simple drug.

[*Journal of the American Medical Association, Chicago*, November 11, 1911.]

THE USE OF RE-BREATHING IN THE ADMINISTRATION OF ANESTHETICS.

By Dr. W. D. Gatch.

Re-breathing, when properly regulated and when the oxygen supply is ample, in the author's opinion is harmless and can be put to a valuable use. If we can prevent anoxemia, over-concentration of vapor, and too great a depth of anesthesia, we can obviate most of the serious objections to the closed method of giving ether. The process of rebreathing prevents the elimination of ether and chloroform by way of the lungs, and over-ventilation of the lungs hastens the elimination. It is suggested that after any administration of ether or chloroform, over-ventilation of the lungs be brought about by the use of mixtures of oxygen and carbon dioxid. Morphin or any drug which depresses the respiration retards the elimination of ether or chloroform. The chief advantages of a method of administering nitrous oxid and, if necessary, ether, by a method of rebreathing are: The rapidity and pleasantness with which anesthesia is established; the ease with which any depth of anesthesia can be secured; the prevention, to a very large extent, of post-anesthetic vomiting, pulmonary complications, and abdominal distention. Its chief dangers are anoxemia, due to a failure to give sufficient oxygen or to an obstructed airway; impediments to the respiration, which in a long anesthesia may exhaust the patient; with cardiac cases, excitement during the period of induction.

[*Le Laboratoire et le Progrès Dentaire*, Paris, No. 19, 1911.]

THE LOCKET CROWN.

By H. Léger-Dorez.

The dentist is often called upon to replace a lost first molar, yet, owing to the forward tipping of the second molar, this is not always an easy operation unless a great deal of grinding is done. If both teeth adjacent to the edentulous space are carious, a small bridge may be inserted; if these teeth are in perfect condition, however, few practitioners will consider it justifiable to devitalize them in order to use them as abutments. In the following the construction of a crown is described which is very suitable for such cases, and which the author designates as a locket crown: On a good plaster model which has been oiled, the posterior half of a tooth is modeled in inlay wax, extending over one-half of the lingual surface of the second molar and covering three-quarters of the second bicuspid. On the buccal side of this connecting link two flat pins of iridio-platinum with holes are inserted. This piece is then invested and cast in 22-k. gold, polished, and replaced on the plaster model. Through the holes in the pins a staple of iridio-platinum wire is inserted, the piece is well oiled, and the buccal half of the molar is modeled in wax. Buccally the wax is allowed to extend only to one-third of the second bicuspid, but to one-half of the second molar. After correctly carving the masticating surface, the iridio-platinum staple is removed, and the wax piece will come off very readily from the piece already cast. Then the buccal half is also cast and polished, and the halves are set in the mouth and fastened together with the iridio-platinum staple. An improvement over this method is suggested by the author, who arranges the perforated pins in the lingual half one over the other, whereby a stronger connection in the buccal half is obtained, the halves to be locked together by a simple, heavy post. Since Léger-Dorez does not go into details about the manner of securely fastening this locket crown in the mouth, Dr. Zuntz, in the *Zahnaerztliche Rundschau*, No. 30, 1911, suggests notching the pins and the post to gain a firm hold by cementing the halves together. It is unnecessary to fasten the crown to the adjoining teeth by cement, as its wedge shape offers sufficient hold. In order to prevent caries of the adjoining teeth, Zuntz further recommends the insertion of gold fillings at the parts where the overlapping portions of the locket crown come in contact with the adjoining teeth.

[*Journal of the American Medical Association*, Chicago, November 11, 1911.]

ANESTHESIA, WITH ESPECIAL REFERENCE TO NITROUS OXID AND ITS SEQUENCES. By Dr. W. H. Allen, Fort Slocum, N. Y.

After briefly speaking of the necessity of a trained anesthetist in any operation, and that of selecting the anesthetic or combination or sequences of anesthetics suitable for the special condition to be met, the author reviews the mortality rates of the various anesthetics, and discusses the physiologic action of, the indications for, and the advantages of nitrous oxid and oxygen, which has proved so valuable and safe in dental practice. For routine use, however, he employs the nitrous oxid and oxygen-ether sequence, the advantages of which are as follows:

(1) Greater safety than ether alone, on account of the lessened amount of the ether inhaled and elimination of the stage of excitement, in which many of the reported fatalities have occurred. (2) Saving in time, the patient being unconscious in forty or fifty seconds, and usually in the third ether stage in three or four minutes. (3) Much pleasanter for the patient in induction and in lessened post-anesthetic vomiting. The latter is probably due to lessened swallowing of ether-laden mucus during induction. (4) With the Teter or Cunningham apparatus there is, in addition, less liability to ether bronchitis and pneumonia and surgical shock, on account of the inhalation of warmed and thoroughly mixed ether vapor and lessened consumption of ether, owing to the inhalations only passing through it.

[*Archiv fuer Zahnheilkunde*, Dresden, 1911, No. 6.]

PORCELAIN, WITH SPECIAL CONSIDERATION OF JENKINS' INLAY PORCELAIN. By Dr. F. A. Brosius.

While in America high- and low-fusing porcelains enjoy about equal popularity, in Europe the low-fusing porcelains are given the preference in inlay work, as they are easier to manipulate. The author employs porcelain in anterior teeth only, using high-fusing porcelain for restoring incisal edges, and Jenkins' low-fusing porcelain for inlays in labial, buccal, and approximal tooth surfaces. He estimates the strength of low-fusing porcelains to be about equal to that of the high-fusing material, while their contraction is greater. This disadvantage, however, is counterbalanced by several advantages. Since low-fusing porcelain melts below the fusing-point of gold, the matrix can be made of thin cohesive gold foil, which can be burnished most perfectly, and adapts itself most accurately to the cavity walls and margins, especially if worked with glass pluggers instead of steel polishers. These glass pluggers can be drawn and shaped at convenience from ordinary glass rods over a Bunsen burner, do not stick to or tear the foil, and produce ideal adaptation of the foil.

For baking low-fusing porcelain, the author prefers the gas furnace to the electric furnace, as burning of the inlays and formation of bubbles is avoided, and greater strength, better contours, and shades are obtained. All these qualities can, of course, be obtained with the electric furnace, but the successful manipulation of the latter requires considerable experience. No less important than close adaptation of the gold-foil matrix to the cavity is accuracy in building up the porcelain. All excess of the porcelain paste should be avoided; the porcelain mass is teased with a camel's-hair brush to the margins and held there until no more danger exists of its running over, *i.e.* until some of the alcohol with which the powder is mixed has evaporated. In this way all uneven and ragged margins are avoided, and greater durability and better esthetic appearance of the margins are insured.

[*Deutsche Zahnaerztliche Wochenschrift*, Berlin, September 23, 1911.]

TECHNIQUE OF CASTING GOLD BRIDGES. By Dr. Rudolf Moeller, Hamburg.

After preparing the abutments for the bridge, Moeller takes an impression in good impression plaster, and then pours the model with a composition of two parts of alabaster gypsum and one part of finely comminuted porcelain, so-called porcelain earth, which can be secured at a low price at any drug store. This composition is almost as fine as plaster, can be mixed very thinly, hardens rather quickly, and after setting becomes almost as hard as pure plaster of Paris. It is advisable though not absolutely necessary to wait three hours before separating the model from the impression. On this model the body of the bridge is modeled in wax, the case is articulated on the articulator, and the model with the wax bridge is invested in the same composition as the model consists of, and cast. If the plaster impression was perfect, the bridge must fit, unless the direction of the abutments required special measures. The investment material recommended is also suitable for other casting and soldering operations. Casting upon the model obtained directly from the impression does away with a great many possibilities of error, which is of decided advantage in complicated casting operations.

[*L'Odontologie,* Paris, November 30, 1911.]

PIVOT BRIDGE FASTENED TO CAST SPLIT FERRULES. BY H. LÉGER-DOREZ.

A method is offered for casting a gold bridge in sections, the body of the bridge to be attached to cast split ferrules, which can be securely fitted to the abutment teeth, no matter how greatly they converge or diverge, without grinding. First the bite is obtained by letting the patient bite on a piece of wax inserted in the edentulous space to be bridged. Then an impression is taken, and a model poured, and articulated with the plaster model obtained from the wax bite. Ferrules are then modeled on the abutment teeth with a beveled extension of wax protruding into the edentulous space. This extension is perforated with a needle bucco-lingually, and split in the middle with a fine steel pen, thus obtaining a ferrule split on the side facing the edentulous space. A thin strip of gold is inserted between the part of the ferrule distal to the edentulous space and the approximating tooth, and the ferrules are removed from the model and cast in 20-k. gold. After polishing and threading the bucco-lingual holes in the extensions in the edentulous space, the ferrules are set on the model and tightened with iridio-platinum screws, the body of the bridge is carved in wax, and, after the platinum screws—which must extend from the buccal to the lingual surface of the bridge body—have been removed, is lifted from the model and cast in 20-k. gold. The ferrules are then set on the abutment teeth in the mouth with very thin cement, and the beveled extensions of the ferrules forced into the corresponding notches in the body of the bridge by grasping the bridge body between the beaks of fine and long tweezers and gently forcing it into place on the extensions on the ferrules. The body is then firmly screwed on the ferrules, the screws extending through the body of the bridge and the holes provided in the extensions on the ferrules. Instead of screws, pivots tightly fitting in the holes of the bridge body and the ferrule extensions, cemented, and cut and polished flush with the buccal and lingual surfaces of the bridge body, will serve the purpose of fastening, though the attachment by screws seems more secure.

The following advantages are claimed for this form of bridge: The bridge can be inserted without grinding the abutment teeth, the masticating surfaces of which are not covered, so that the occlusion remains as before. The ferrules do not encroach seriously upon the tissues at the cervix of the abutment teeth, and the work can be finished on the model without any discomfort to the patient. The abutment teeth are not injured in the least, the bridge can be easily removed, and will be found serviceable, especially in cases of greatly diverging or converging abutment teeth, which in the preparation of other forms of bridges must be ground to parallel relationship. The bridge can be inserted in the mouth without any difficulty.

[*Deutsche Monatsschrift fuer Zahnheilkunde,* Berlin, October 1911.]

THE ETIOLOGY OF HYPERCEMENTOSIS. BY DR. GUTTMANN, BRESLAU.

Prompted by the case of a woman patient of thirty-six years of age, in whom no less than seven extracted roots and teeth exhibited extensive hyperplasia of the cementum, the author delves into a problem which still requires a great deal of elucidation. The origin of hypertrophy of the cementum or hypercementosis, especially if it occurs in several teeth of one individual, seems to presuppose a predisposition of presumably hereditary character. The causing agents for the formation of secondary cementum are in all probability mechanical, such as abnormal stress of mastication, slight affections of pericementitis of chemical or infectious origin, in which the vital energy of the pericemental cells has not yet been impaired, and possibly constitutional diseases which produce alterations in the hard tissues, such as gout, syphilis, and rickets.

In our literature so far hardly any statements based on definite proofs concerning the etiology of hypercementosis have appeared. Most of the statements published are simply hypotheses containing a great deal of plausibility, which have, however, not yet been proved by exact investigations. These hypotheses, considering our modern methods of research, can easily be tested as to their correctness, and offer a most fertile field for investigators commanding a sufficiently large material. In the main, the following questions regarding hypercementosis demand a solution: (1) Does excessive strain upon the teeth produce hypercementosis in abnormalities of the teeth and in artificially produced excessive strain, as in abutments? (2) Is it possible to demonstrate statistically a higher percentage of cases of hypercementosis in connection with constitutional diseases, such as gout, syphilis, and rickets? (3) Is is possible to establish hereditary disposition or other congenital factors as causes for hypercementosis, by securing exact anamnesis in a large number of cases? The solution of these difficulties is beyond the powers of one individual investigator, and it is the duty of dentists as well as dental institutions to furnish the material necessary for a satisfactory solution of this problem. By a number of excellent photomicrographs, Guttmann indicates the direction in which future investigations will have to be made.

[*American Journal of Clinical Medicine*, Chicago, November 1911.]

SOME UNTOWARD FACTS REGARDING FLETCHERISM. EDITORIAL.

Perhaps no department of medicine, in practice, ignores so completely the old-established principles of biology and physiology as dietetics. Albeit, it is well known that digestion does not entail the proper absorption, and hence the assimilation, which prevents intestinal toxemia. While it is definitely settled that the human body is wrapped around a tube, and what is in the tube is not yet in the body; while it is also established that starch and sugar digestion takes place partly in the mouth, protein chiefly in the stomach and partly in the intestines, while starch, sugar, and fat are digested chiefly in the intestines—still, indigestion is regarded as of mouth or stomach origin, hence the popularity of mastication and pepsin nostrums for dyspepsia, irrespective of its character. Furthermore, digestion, which is the preparation of food for absorption and assimilation. is regarded as the end and not as the means. All sorts of morbid conditions charged to indigestion are often due to fermentative changes in food that has been properly digested in too great quantities for an organism unsuited for its absorption and assimilation. Although many states, like scurvy in children, hepatic and renal instabilities in the insane and neuropaths, result from monotony in diet, and while many bloodvessel degenerations and strains result from hyperacidoses and toxemias produced by undue use of carbohydrates, still the old myth that all these states are due to an undue meat diet serenely dominates dietetics, despite all physiologicochemic revelations to the contrary. One popular fad which ignores these physiologic axioms is Fletcherism. The proper mastication is prescribed as the nostrum for all assimilative and absorptive disorders. One natural result of this fad is the excessive or disproportionate use of starchy and sugary foods. These substances are very frequently the sources of paralyses occurring in persons who do not eat meat excessively and who abstain from alcohol.

As reliance on Fletcherism alone produces not only these disorders, but a tendency to monotony of allegedly easily digested foods, the untoward effects of Fletcherism are liable to be particularly dangerous at the periods of stress, when the need of elimination is great, while at the same time eliminatory powers are decreasd. Thorough mastication is desirable, but it is not a panacea. In whatever manner we may eat our food, it is desirable, and at periods of stress it is essential, that it be adjusted in quantity to the needs of the body, and nicely proportioned between protein, carbohydrates, and fats, for the necessities of metabolism.

Like all other fads, Fletcherism becomes dangerous in so far as it is accepted as a cure-all and as a prevent-all. There is almost as much peril in the physical-culture nostrums, in the hydriatic nostrums, the psychic nostrums, in starving cures, mastication cures, and all the other present-day pseudo-medical eccentricities, as there was in the alcohol "bitters," and other almanac-advertised fakes, of a generation ago.

People whose digestive apparatus and eliminative organs are going wrong are not good subjects for the medical tinker. They need the careful individual attention of the best obtainable physicians.

[*Archiv fuer Zahnheilkunde*, Dresden, No. 7, 1911.]

THE PERFECTED PORCELAIN INLAY. GLASS BURNISHERS. By Dr. N. S. Jenkins, Paris.

From the very beginning of porcelain inlay work, one of the greatest problems was the securing of exact adaptation at the edges of the cavity. If platinum was used for the matrix, the difficulties were greater than with gold, for platinum, however thin and however often annealed, is far more refractory than gold foil. Even gold had its peculiarities, and its folds and wrinkles, especially in obscure and complicated cavities, often caused the conscientious dentist much trouble. From the beginning, many ingenious methods were designed to obtain a matrix with a proper edge; various swagers were invented, which served a useful purpose in many cases. innumerable methods of cavity preparation were described; all, however, were eventually reduced to the original proposition, namely: Shape the cavity as nearly as practicable with parallel walls, have no undercuts, polish every surface and every edge. Many methods of burnishing were proposed, with steel, with ivory, and with agate instruments, and the competent operator at last came to believe that the final difficulty had been overcome. It remained, however, for Weber to present to the American Dental Club of Paris a device so simple yet so effective that one wonders why it had not been thought of before. It consists in burnishing the foil, either directly to the cavity or in the model obtained from an impression, with a glass burnisher.

These instruments are very easily made. One takes a simple glass rod, as obtained from any dealer in chemical goods, grasps one end with a pair of pliers, and holds the rod over a Bunsen burner, with the flame upon the rod just behind the pliers. As soon as the glass is softened, one pulls the rod out to the dimension required, and breaks it off with a twist of the pliers. The small point remaining is then held over the flame, where it may be melted quickly and rolled up into a ball of the desired size. The shank can be curved in any direction by holding the rod over the flame back of the ball, and when softened it may easily be bent to any angle. There is nothing as smooth as glass, and these burnishers not only subdue, with a light touch, all the folds and wrinkles, but do this without cutting or tearing the gold, and make the whole matrix stiffer and less liable to distortion than is the case with any other method. Wherever possible, it is desirable to work from an impression of the cavity. A certain number of cavities, however, remain in which porcelain is indicated, and where the matrix must be made directly in the cavity. But whenever it is practicable to obtain a perfect model of the cavity in impression material, it is well to do so. From this impression a cement model can be made, into which the operator can burnish the matrix to perfection, for glass burnishers are equally useful in either of these two methods.

PERISCOPE.

Cleaning Files.—Clogged files can be cleaned with ether, with benzin, or with spirits of turpentine and a stiff brush.—*Journ. Dentaire Belge.*

Retarding the Setting of Plaster.—To make plaster set slowly, it is mixed with vinegar instead of water.—R. MOELLER, *Zeitschrift fuer Zahnheilkunde.*

Relieving Pain After Extraction.—An excellent remedy for pain after extraction consists in swabbing out the socket with pure lysol.—P. A. ASH, *Commonwealth Dental Review.*

Potassium Cyanid as a Flux in Soldering.—Potassium cyanid is more desirable as a flux than borax, when the investment is weak or the solder is to be run into a hole. —C. H. NEILL, *Dental Digest.*

Sterilizing Wax.—Wax is sterilized by boiling it for half an hour in a large vessel containing water to every liter of which 140 grams of oxalic acid has been added.—R. MOELLER, *Zeitschrift fuer Zahnheilkunde.*

Gum Camphor for Adapting Inlay Matrices.—Gum camphor, packed into the partly adapted inlay matrix, serves to swage the metal to a close adaptation, and when burned out leaves no residue.—C. H. NEILL, *Dental Digest.*

Softening Rubber Before Packing a Plate.—Copper screening, such as may be obtained in any hardware store, makes the best support for softening rubber over steaming water while packing flasks.—C. H. NEILL, *Dental Digest.*

Facilitating the Cutting of Aluminum.—Aluminum can be cut more easily and without damage by laying it on a flat surface, polishing it and cutting with a knife, dipped in paraffin oil.—R. MOELLER, *Zeitschrift fuer Zahnheilkunde.*

A Quick Polish.—Oxid of tin, if applied with a leather disk on the engine, immediately produces a fine polish on gold, porcelain, or vulcanite, rendering it unnecessary to use the laboratory lathe.—G. A. WILSON, *Journ. Allied Societies.*

Preserving Hydrogen Dioxid.—To preserve hydrogen dioxid, the manufacturers usually add a little sulfuric acid. If this acid is neutralized by a little alkali before use, the most is made of the dioxid.—T. S. DIXSON, *Commonwealth Dental Review.*

Cleaning Burs.—An old, worn-out lathe brush, carefully cleansed and trimmed, is much better for cleaning burs than the wire brushes generally used. The latter are too small, soon get out of order, and quickly blunt the burs.—H. J. MORRIS, *Dental Record.*

Aid in Taking an Impression for a Bridge.—Cases often present in which difficulty is encountered in taking an impression for a bridge. If milk of magnesia is painted over the parts to be reproduced, the impression may be taken out without any discomfort to the patient or trouble to the operator. —L. KOHN, *Odontologist.*

Cleaning Broaches.—The broach to be cleaned is laid on the washstand, and brushed with a stiff brush, as, for instance, a small nail-brush, in the direction away from the barbs. Clean broaches should be kept in 95 per cent. alcohol. The cleaning should be done before the pulp débris or cotton threads have dried on the broach.—K. P. HEINTZ, *Dental Digest.*

Imparting a Dull Finish to Aluminum.—To impart to aluminum the appearance of dull silver, the piece is laid in a hot bath of a ten per cent. solution of caustic soda saturated with table salt. After leaving it in the bath for from 15 to 20 seconds, the piece is washed and brushed, and again immersed in the bath for 30 minutes, washed, and dried in sawdust.—*Journ. Dentaire Belge.*

Using Old Burs as Vulcanite Trimmers.—If old burs are clamped into a large-sized broach handle, such as can be obtained at tool shops and watchmakers' stores, or at dental depots, they can then be ground flat and quickly sharpened and used for trimming between the teeth of vulcanite dentures. A double service will thus be obtained from these old and otherwise useless burs.—H. J. MORRIS, *Dental Record.*

Rendering Cork Stoppers Impermeable.—In order to render cork stoppers impermeable to alcohol and acids, they are dipped in a cold solution of rubber in chloroform, and allowed to dry in the air until the chloroform has evaporated.

Another method consists in dipping the corks into very hot, though not boiling paraffin for about five minutes, and allowing them to dry thoroughly.—*Journ. Dentaire Belge.*

A Good Temporary Filling.—Gutta-percha is not very cheap, and sometimes large temporary fillings are required only for a day or two; also, gutta-percha is sometimes troublesome to remove when one is busy. An excellent substitute is to be found in wool or cellulose wadding with a drop or two of wax on it. This sets sufficiently hard, is easy to remove and does not become putrid. It is easily packed in the cavity and smoothed with a warm burnisher.—H. J. MORRIS, *Dental Record.*

Finishing Amalgam Fillings.—All amalgam fillings should be carefully polished. One of the best ways of doing this is to apply pumice soap with the engine brush after first scraping, disking, or grinding the fillings. Pumice soap in various grits is obtainable at most chemists, and has no equal as a scouring agent for removing obstinate stains on teeth, etc. When coarse, it will cleanse dirty hands more quickly and thoroughly than any of the spirit solutions sold for this purpose.—H. J. MORRIS, *Dental Record.*

Gaining Space for the Adjustment of Clamp Bands in Orthodontic Treatment.—Often the placing of clamp bands is attended by some annoyance, especially if the molars and bicuspids are in very close contact. The tying of a ligature of silk, such as is used nowadays instead of brass wire, in such a manner that it will act as a wedge between the teeth, passing the ligature through at the gum line, making a loop, and leaving it for a day or two, will produce space for the more ready fitting of bands previous to cementing them in place.—G. MUNROE, *Dental Review.*

Method of Repairing a Gold Shell Crown.—If a gold shell crown is worn out, it is removed from the tooth, immersed in acid, and cleaned of all cement. A small amount of softened inlay wax is then placed in the crown, the latter replaced on the tooth, and the patient is requested to close tightly. The excess of wax will escape through the holes in the cusps, which are then carved so as to restore the articulation. The wax that has been forced down on the inner wall of the crown should also be removed. The crown is then invested and cast with gold. The sprue should be attached on the occlusal surface.—R. C. THARP, *Western Dental Journal.*

A Case of a Three-rooted Lower First Molar.—Mr. L. L., a native of Italy, presented himself with pain in the right half of the mandible. As he was unable to speak English, it was impossible to persuade him to have treated the only tooth affected with caries, namely, the lower right first molar. Since the patient insisted, the tooth was extracted. The distal root was found to be completely bifurcated, rendering the molar a three-rooted one. The anterior or mesial root had two root-canals which were so clearly defined as to render this root also almost bifurcated, the two roots being united only by a thin septum of dentin. The carious portion was located over the distal roots.—W. H. WELCH, *Dental Brief.*

Preparing Large Approximal Cavities in Anterior Teeth for Porcelain Inlays.—The preparation of large approximal cavities in anterior teeth in which the lingual wall is unsupported by dentin should be made as follows: The lingual wall should be removed, and the cavity extended lingually to a point where a step may be secured, for it is practically impossible to dislodge the cemented inlay from a cavity prepared in this manner. In this class of cavities it is not absolutely necessary that the labial outline be convex, although the angles should be extended, because the step portion will resist all attempt at displacement. In this form of preparation the matrix is removed and the inlay inserted from the lingual surface.—F. E. CHEESEMAN, *Items of Interest.*

Sarcoma Due to an Ill-fitting Denture.—The majority of dentists do not give sufficient attention to artificial dentures which have been in the mouth for years and have become ill-fitting and useless. This loose condition causes a growth which may develop into a sarcoma or carcinoma by the constant irritation. Such a growth was removed from the upper left side of the mouth of a woman. It had remained in the mouth ten years, and at the points of attachment the alveolar process was absorbed so as to produce a marked depression. After the removal of the growth there was profuse bleeding, so that the tissue had to be clamped with an artery forceps and held for half an hour, when the hemorrhage ceased. Fearing that the growth might be malignant, a section of the tissue was microscopically examined and was found to be sarcoma. This growth may therefore return at any time.—A. B. ALLEN, *Dental Review.*

An Improved Method of Fitting Detached-Post Crowns to a Root.—The tooth to be crowned is ground down to within 1/60 inch of the gum, a wire measurement of the root is taken, and a funnel-shaped tube of 30-gage silver or gold plate, about one-half inch high is made, the narrower end measuring the same as the wire measurement of the root. This tube is trimmed to fit the gum, allowing it to extend under the same. The canal is then prepared for the reception of the post, the tube is placed on the root, and firmly held there, while with a suitable root-facer the root is shaped up under the gum. After the root is shaped below the gum line, the tube is removed, and the tooth is ground to fit the tube with a fine-grit carborundum stone, thus insuring a perfect fit between the band and tooth. The crown is then flattened on a lathe stone and mounted in the usual way. By this method the gums are cut very little, and a most accurate fit is secured.—G. G. BELL, *Dental Digest.*

Preparing Approximal Cavities in Upper Incisors and Canines for Porcelain Inlays.—The preparation for approximal cavities in incisors and canines should be as follows: If the lingual wall is supported by dentin, the usual concave outline on the labial surface should be extended at both the gingival and incisal angles, obtaining a slightly convex instead of the concave labial outline in general use. These extensions allow for the paralleling of the labial and lingual as well as of the incisal and gingival walls. The axial wall will then be at right angles to all of these walls. The convex labial outline secures even more resistance against force than one that is parallel with the lingual wall.

In this form of preparation the matrix is removed and the inlay is inserted from the labial surface.

All of the former methods of preparation for this class of cavities seem to have been incorrect, as the labial half of the cavity, including the axial wall, has been more or less saucer-shaped because of the concave labial surface. It is really remarkable that so many inlays, placed in cavities prepared in this manner, have resisted the dislodging force.—F. E. CHEESEMAN, *Items of Interest.*

Preparing Approximal Cavities in Lower Incisors and Canines for Porcelain Inlays.—Owing to the fact that cavities in the lower incisors are usually shallow, and that there is generally a small amount of dentin present, it is difficult to obtain sufficient anchorage in the cavity proper without serious danger of exposing, or at least of impinging upon, the pulp. It is therefore recommended that the walls be paralleled, as nearly as possible, without endangering the pulp, but that entire dependence for anchorage be placed upon a dovetail extension on the labial surface that shall be cut well through the enamel, the dovetail extending toward the mesial or distal wall, as the case may be. The characteristic formation of the lower canines necessitates that this same procedure be employed.

Entire certainty may be felt that this form of preparation will securely lock the inlay to place, and it has proved of invaluable assistance in these cases.

For incisal restorations the usual lingual outline of the cavity should be extended at the gingival wall, so that a broader seat and a firmer anchorage will be secured. It should also be extended lingually at the median third of the tooth, securing a dovetail form of preparation, which practically solves the problem of retention in these troublesome cases.—F. E. CHEESEMAN, *Items of Interest.*

An Auxiliary Matrix.—A simple method of overcoming the difficulty often experienced in adapting a matrix to an approximal occlusal cavity when the cervical portion of the missing wall presents a concave surface due to the bifurcation of the roots, is offered in the following: By the use of a sheet of copper 5/1000 of an inch thick in conjunction with a mechanical matrix and holder, or an additional strip of copper or steel, ligated in position, an appliance may be quickly made which, when removed after the filling has been inserted, will be found to have preserved the desired shape of the filling, leaving no overhanging portions at the cervix to be trimmed away.

A piece of copper plate, thoroughly annealed and large enough to extend to about one-eighth of an inch beyond the buccal and lingual margins, is pressed with cotton or bibulous paper pellets to conform to the concave root periphery at the cervix. The copper is then carefully removed, the concave portion is touched with zinc chlorid, and over an alcohol flame, soft solder is flowed into the depression, any excess of solder being removed with a disk. The prepared copper piece is then placed in position, around it a mechanical or specially prepared matrix is adjusted, and when this has been fully tightened, the free edge of copper is burnished against the steel. If the cavity is to be filled with amalgam, hard wax instead of solder may be used for filling up the concave surface on the copper. In either case, a slight excess of contouring material is of advantage, the copper plate being made to embrace the tooth more tightly.—A. P. LEE, *Dental Summary.*

Restoring an Incisal Corner with Silicate Cement and Gold.—A number of cases present in which an incisal corner of an anterior tooth has been destroyed by caries or by trauma. Restoration with gold would mean a large unsightly and most conspicuous defect in appearance. A porcelain inlay may not be desirable. The dilemma may be solved by preparing the cavity as for a gold inlay, cutting the frail labial enamel away to where it is supported by sound dentin. If caries has approached the junction of the lobes of the tooth, it is best to cut to the labial groove. If the pulp has been involved, as it is likely to be, anchorage may be secured by a pin in the root-canal. Otherwise, anchorage must be obtained by an extension lingually. After preparing the cavity, inlay pattern wax is pressed into the cavity, and wax is carved to the desired contour. Finally, before removing the pattern, with a sharp hatchet excavator, in the labial surface of the wax an undercut cavity is prepared for the reception of a silicate cement filling in the prospective inlay. A margin of wax is left on the approximal side, also on the incisal edge of the wax pattern, to secure retention and incisal strength. The wax pattern is removed on a sprue wire, invested, and cast. If necessary, after casting, the cavity in the inlay can be touched up or the undercuts improved. The inlay is cemented to place with oxyphosphate cement; then the labial cavity is filled with a silicate cement filling, and the small margins of gold will be not at all conspicuous. Thus the esthetic appearance of the silicate filling is combined with the strength of a gold inlay.—R. E. MACDONALD, *Dental Practice.*

Disinfecting the Office and Waiting-room by Formaldehyd.—Needless to say, the dentist's office and waiting-room require as thorough a disinfection as is deemed imperative in hospitals, public waiting-rooms, and all buildings where large numbers of people congregate daily. Hence the utility of the accompanying table—it gives the quantities of materials necessary for the disinfection of rooms of various sizes by means of the action of potassium permanganate on formaldehyd:

Size of room in cubic meters ...	50	75	100	125	150	200	250
Pot. permanganate required	1 kgm.	1.5 kgm.	2 kgm.	2.5 kgm.	3 kgm.	4 kgm.	5 kgm.
Sol. formaldehyd (40% diluted with equal vol. water)	2 lit.	3 lit.	4 lit.	5 lit.	6 lit.	8 lit.	10 lit.
Capacity of vessel in which materials are mixed.	25 lit.	50 lit. or 2x25 lit.		75 lit. or 3x25 lit.		100 lit. or 4x25 lit.	125 lit. or 5x25 lit.

The formaldehyd solution is poured on to the potassium permanganate placed in the vessel, preferably at a temperature of 20° C. —R. DŒRR and H. RAUBITSCHEK, *Pharm. Post*, per *Drug Topics.*

Public Recognition of the Necessity of Oral Hygiene.—Under the heading "By All Means Save the Teeth," Graham Hood contributes to the columns of the *New York Globe* the following article, which is symptomatic of the general public recognition which the oral hygiene movement has gained:

The decision to establish a free dental clinic for the school children, recently announced by the educational authorities of New York city, is one of the most important movements for the public health that could possibly be undertaken. It may be true that in one sense of the word filling of the children's teeth may not be strictly in line with the system of public school education; yet look at the matter from another viewpoint, and you will see how closely one depends upon the other. Of what use, for example, would an educated mind be if it were not maintained by a reasonably healthy body? Physical strength plays quite as important a part in the struggle for success as mental vigor; and while cases have been known in which individuals have triumphed despite the fact that they were handicapped by bodily weaknesses or deformities, common sense teaches us that there can be no better asset in life than the combination of a vigorous, well-trained mind in a strong, healthy body.

It makes no difference how slight our knowledge may be in regard to matters of health, ordinary intelligence tells us that good teeth are absolutely necessary to the maintenance of good health. Even the child knows that the food we eat is the fuel that keeps the bodily mechanism running smoothly, and that if it is to perform its services in a proper manner the food must be well chewed, not bolted hurriedly and in large pieces. It is the office of the teeth to enable us to masticate this food. Without good teeth, thorough mastication would be impossible, in which case perfect digestion would likewise become impossible, and as both assimilation and nutrition depend upon digestion and health, and even life itself is a matter of assimilation and nutrition, we are confronted by the very logical conclusion that the condition of a man's health, and not infrequently the length of his life, is determined by the condition of his teeth.

It is an extremely simple problem, a sort of unbroken chain of causes and effects. Given good teeth the body may be kept in proper condition far more easily than would be possible were decayed teeth the cornerstone of the physical process of nutrition, and as the mind, however capable it may be, requires a strong body to carry out its directions, it can readily be seen that even lack of mental strength—as inability to concentrate or absence of initiative—may not improbably be the direct effect of poor teeth masticating food badly.—*Drug Topics.*

HINTS, QUERIES, AND COMMENTS.

CASTING UNDER STEAM PRESSURE DEVELOPED IN THE VULCANIZER.

One source of pressure which is available in every dental laboratory thus far seems to have been overlooked in regard to its application to the casting process, *i.e.* the steam pressure developed in the vulcanizer.

Any dentist who possesses a compressed-air casting outfit, by buying rubber "steam" tubing of suitable size and length, and attaching one end thereof to the escape pipe of the vulcanizer, the other end to the casting apparatus, will obtain better results from the steam pressure thus secured than from the use of compressed air.

The hot steam does not deprive the molten gold of as much heat as expanding air, and the manometer on the vulcanizer indicates the exact amount of pressure.

C. M. TORRANCE, D.D.S.

Frankfort-on-Main, Germany.

MAKING A POST OF GOLD WIRE.

TO THE EDITOR OF THE DENTAL COSMOS:

Sir,—I wish to give a method of making a post of gold wire, viz:

After the selection of gold wire of suitable gage, it is run through rollers once or twice until sufficiently flattened. With a pair of pliers in each hand both ends of the wire are caught, and while the pliers in the left hand are held stationary, the flattened wire is twisted by means of the pliers in the right hand until it assumes the auger or lightning-rod character of thread.

This treatment of the wire gives more rigidity to the post, together with better anchorage.

Respectfully,
JOHN A. PERKINS, D.D.S.

Nashville, Tenn.

OBITUARY.

DR. GEORGE G. MILLIKEN.

We regret to announce that Prof. George G. Milliken, of the dental department of the University of Pennsylvania, died on Friday, December 21, 1911. An extended notice of his career will be published in the next issue of the Dental Cosmos.

DR. SAFFORD GOODWIN PERRY.

Died, at his home, 130 West 57th st., New York, N. Y., on Friday, December 22, 1911, from uremic poisoning, Safford Goodwin Perry, D.D.S.

Dr. Perry was born at Wilton, Saratoga county, N. Y., in 1844. His parents were DeMerick Perry and Lydia Jane (Grippen) Perry. His early education was obtained in the public schools in the locality of his birth, in which he was later, for a time, himself a teacher.

His natural tendencies and qualifications led him to develop an interest in dentistry, and he began his studies under the direction and preceptorship of his cousin, Dr. George Perry of Yonkers, N. Y. In 1863 he came to Philadelphia and entered as a student at the Pennsylvania College of Dental Surgery, from which institution he was graduated February 25, 1865. Returning at once to Yonkers, he began the practice of his profession in association with his cousin and preceptor, Dr. George Perry, in that town. Soon after this association was consummated, Dr. George Perry determined to open an office in New York city, and the two cousins alternated weekly in the charge of the New York and Yonkers offices, which arrangement was continued until the death of Dr. George Perry a few years later. The New York office in Madison ave. thereafter occupied the exclusive attention of Dr. S. G. Perry, and he continued to practice in that city until his death.

Dr. Perry married, April 26, 1883, Miss Frances Shedd Thomas, who, with two daughters, survives him. The funeral services were held on Sunday, December 24th, and his remains were interred at Woodlawn Cemetery, New York.

The news of Dr. Perry's death came as an unexpected shock to all of his friends. It had been known that he had been suffering for a few days from an indisposition supposed to be a mild attack of ptomain poisoning, but which was not at first regarded as serious; symptoms of kidney trouble, however, supervened, followed by evidences of uremic poisoning, which soon became alarming, and which terminated fatally scarcely more than a week from the inception of the attack.

It is difficult for one who has stood in such close relation to Dr. Perry as has the writer of this sketch to set forth the characteristics of his life or to portray in anything like just terms the influence exerted by that life. A favorite expression often used by Dr. Perry in describing the, to him, more admirable attributes which he was wont to discover in this or that friend was his "heart quality," and in that phrase he summed up his conception of that which was to him noblest and best in the lives of those nearest to him. Temperamentally he was emotional, in that he responded with the best that was in him to those impulses that spring from the heart or appeal to the deeper psychic nature. He was a lover and devotee of the beautiful in art, in music, painting, and sculpture. His nature thrilled in response to all that appealed to the higher things of life, and he was ever the advocate of that type of culture which finds its greatest pleasure in the contemplation of the ideally good and beautiful. A disciple of Abou ben Adhem, "he loved his fellow men," and was ever the charming, sympathetic, and helpful comrade.

His spirit of helpfulness was perennial. Whenever the appeal for assistance to a distressed or fallen colleague came to him, his response was instant, cordial, and generous; indeed, on many occasions he has sought out and helped those who needed material assistance, and enlisted the co-operation of others in the work of alleviation, doing this service in such a quiet and unostentatious way that none but those immediately concerned were ever aware of his helpfulness.

His advice and counsel were always sought in connection with matters relating to the professional organization of his locality. His high standards of right and his intuitive insight into the characters of men made his judgments of great value in all matters of professional policy.

As a practitioner of dentistry, Dr. Perry took high rank among the leaders of his profession. He loved his work, and dentistry is his debtor for many helpful aids in the technique of its operations which originated in his mind. The set of separators known by his name, his improvements resulting in the Perry-Weber engine, the Howland-Perry crown, his improvements in the forms of gold pluggers and excavating instruments, and his numerous other inventions and suggestions, have materially enlarged our list of useful devices. While he was not a frequent writer, his contributions to dental literature were all-important as tending to the improvement of technical methods or the uplifting of professional standards. He possessed an abiding faith in the importance of his calling as a humane service, and he respected it accordingly. Perhaps the greatest and most important influence which he unconsciously exerted emanated from the dignity and respect with which he treated his professional work, thus stimulating the same wholesome attitude in all of his colleagues who enjoyed his acquaintance. He lived his life in such a way as to make his influence upon others his chief benefaction.

As a teacher he was clear, logical, and forceful, whether in addressing a body of his colleagues or his class of undergraduate students. Dr. Perry was lecturer on operative dentistry in the dental school of the University of Pennsylvania, and a member of the Odontological Society of New York, the First District Dental Society of New York, the Dental Society of the State of New York, and of the National Dental Association. He was also a member of the Lotus Club, the New York Art Club, and the New York Athletic Club. His interest in music led him into affiliation with musical organizations and with musical people, and his enjoyment of the musical opportunities of New York was genuine and intense. He possessed a cultured mind, philosophic in its tendencies, and was a constant reader of high-class literature. He was in all respects representative of the best type of the cultivated professional gentleman.

DR. CHESTER T. STOCKWELL.

Died, in Springfield, Mass., October 25, 1911, of heart disease, in his seventy-first year, Dr. Chester T. Stockwell.

In the demise of Dr. C. T. Stockwell a philosopher, a scientist, and a dental practitioner of great note has passed away.

Chester Twitchell Stockwell was born September 5, 1841, at Royalston, Mass., as the son of Emmons and Elvira (Wood) Stockwell. He was educated in the schools of Royalston and Winchendon, and later attended Eastman's business school at Poughkeepsie, N. Y. From 1863 to 1866 he was engaged in business, first in Worcester, then in North Carolina, but in 1867 and 1868 studied medicine at Fitchburg, Mass., and afterward matriculated in a Philadelphia medical college—which he left, however, to take up newspaper work, being on the staffs of the *Iowa State Register* at Des Moines, and of other journals, for two years. Meanwhile he began the study of dentistry, and in 1870 began to practice that profession. After a sojourn of several years in Colorado he settled in Springfield, Mass., in 1875, and, after having been in partnership with Dr. Lester Noble and Dr. J. Searle Hurlbut, established an independent and large practice. A dentists' study club was formed in Springfield in the early eighties, and this resulted in the founding of the *New England Journal of Dentistry,* in 1882, to which Dr. Stockwell as editor contributed many important papers and editorials from 1882 to 1884. Dr. Stockwell's promulgation of the germ theory of dental caries, which he set forth in a paper read before the New England Dental Society in Boston and other societies and published in the *New England Journal of Dentistry* of November 1882 under the title "The Etiology of Dental Caries—Acids or Germs, Which?" marked an epoch in the development of dental science, and initiated a literary campaign both for and against the germ theory both here and abroad, and started a correspondence between the author and noted domestic and foreign investigators which was continued up to the time of Dr. Stockwell's demise. As one of his professional friends said in an address: "From this paper dated the beginning of the movement which resulted within two or three years following in the complete overthrow of the older theory of dental decay."

The high esteem in which Dr. Stockwell was held by his professional comrades was evinced by a complimentary banquet tendered him at the Massasoit House in Springfield, Mass., on October 18, 1904, at which sixty-five *confrères* from all parts of the country united to pay him their tribute, and innumerable letters and telegrams from the most notable scientists living were read.

Dr. Stockwell also won wide reputation through his philosophical writings, in which he propounded Monism, the most important of these being "The Evolution of Immortality," published in 1887, and "New Modes of Thought," published in 1901.

Aside from his prominence as a dentist, a scientist, and a philosopher, the deceased was a man of gentle nature, of fine and delicate sentiment, a true lover of the beautiful in nature, a profound believer in the ultimate victory of the good, a fervid optimist, a delightful comrade in rambles through the country—in short a personality of unusual sweetness and balance, a beautiful example of rectitude of conduct and action.

Dr. Stockwell married, in 1866, Sophia Golding Pierce of Royalston. One daughter, Miss Nella May of Springfield, and two sons, Dr. Herbert E. Stockwell of Stockbridge and Arthur E., of Philadelphia, survive him.

Wordsworth's lines in "Tintern Abbey" have been very fittingly applied to Dr. Stockwell:

I have felt
A presence that disturbs me with joy
Of elevated thoughts; a sense sublime
Of something far more deeply interfused,
Whose dwelling is the light of setting suns,
And the round ocean, and the living air,
And the blue sky, and in the mind of man;
A motion and a spirit that impels
All thinking things, all objects of all thought,
And rolls through all things. Therefore am I
Still well pleased to recognize
In Nature, and the language of the sense,
The anchor of my purest thoughts, the nurse,
The guide, the guardian of my heart, and soul
Of all my moral being.

DR. AUGUSTUS BECKMAN SMITH.

Died, in New Haven, Conn., November 12, 1911, of nephritis, in his eighty-sixth year, Dr. Augustus Beckman Smith.

A venerable patriarch of dentistry has been removed in the demise of Dr. Augustus B. Smith, who was born in White Plains, N. Y., on October 15, 1826, as the son of John Malt Smith, professor of sciences at Wesleyan University, and Amanda (Day) Smith. He received his early education at Daniel Chase's school for boys in Middletown, Conn., and in 1852 entered the dental pupilage of Drs. Porter and Merritt of New York. After serving for several years as assistant to Dr. Samuel Mallett of New Haven, Conn., he established a dental practice in the same city in 1860, which he maintained until the age of seventy-five years. Owing to his great success and his wide reputation, the Dental Commissioners of Connecticut granted him a certified license in 1893.

Deceased was an active member of the New Haven Dental Society and at one time secretary thereof; he also held membership in several other dental societies which in time became amalgamated with other societies, and in the New England Dental Society. He was one of the early practical investigators into the use of nitrous oxid in dental practice, obtaining the gas from Professor Silliman of the Sheffield chemical laboratories of Yale University. In co-operation with Dr. Bevins of Boston he conducted some of the early experiments in perfecting the method of vulcanizing rubber for vulcanite dentures; he also invented a useful punch. It was his custom every year to undertake a journey of investigation in order to observe and have demonstrated to him any innovation in dental science or mechanics. These journeys, together with his appreciative absorption of current dental literature, kept him well abreast with the advancement of his profession.

Dr. Smith was married twice, first to Emily Bartlett of New Haven in 1849, and after her demise to Mrs. Emmeline Braman of Manhattan in 1897, who survives him, to-her demise to Mrs. Emmeline Braman of Rev. J. O. Munson.

Interment was made at Evergreen Cemetery, New Haven.

DR. FRANK L. HARRIS.

Died, in Harrisonburg, Va., December 10, 1911, of Bright's disease complicated by heart trouble, in his sixty-fourth year, Frank L. Harris, D.D.S.

The last of four brothers, all of whom had devoted their lives to the practice of dentistry, Dr. Frank L. Harris has passed away.

He was born at Mt. Meridian, Augusta county, Va., on September 12, 1848, as the son of Alanson and Sophia Ann Harris. He was graduated from the Baltimore Dental College in 1870, and at once began the practice of his profession in Harrisonburg, first in association with his brother, the late Dr. James H. Harris, after whose removal to Baltimore he conducted his practice alone, with the exception of the year 1878, when he was demonstrator of operative dentistry in the Baltimore Dental College. He was exceedingly successful in his practice, and was beloved by his patients and fellow practitioners for his genial disposition, his integrity of character, and his wide range of interests. He was a zealous church worker, a Mason of high order, also a Knights Templar, Odd Fellow, and member of the Knights of Pythias, and a liberal and high-spirited citizen.

In 1872, Dr. Harris married Miss Sallie McLain Lurty of Clarksburg, W. Va., who survives him, together with one son, Dr. Lurty N. Harris of Mill Creek, W. Va.

Interment was made with Masonic honors in Woodbine Cemetery.

"IN MEMORIAM" RESOLUTIONS.

Dr. R. H. Clifton.

At the regular meeting of the Delaware State Dental Society held December 6, 1911, the following resolutions of regret were adopted regarding the loss of Dr. R. H. Clifton, who died at his home in Smyrna, Del., November 10, 1911:

Resolved, That it is but a just tribute to the memory of the departed to say that in the removal by death of Dr. Clifton the state has lost one of its best citizens and best dentists, and the society a capable and worthy member. His sterling qualities and upright character, his constant efforts for the betterment of the dental profession, his intimate association with every good work, and his strict fidelity to duty in all his professional relations, form an endearing tribute to his memory.

Resolved, That this heartfelt testimonial of our sympathy and sorrow be forwarded to the widow of our departed friend, and a copy be spread upon the minutes.

P. A. Traynor,
Boyd H. Baker,
Warren S. P. Combs.

Brief Necrology.

Dr. Frank A. Vincent of Salt Lake City, Utah, on November 30, 1911.

Dr. Isaac Hills of Belfast, Me., on December 20, 1911. Deceased was a veteran of the civil war.

Dr. M. B. Metzler of Heppner, Ore., on November 21, 1911. Deceased was a graduate of the Kansas City Dental College.

Dr. Hugh Pierson of New Orleans, La., on November 23, 1911, in his sixty-eighth year. Deceased was a civil war veteran.

Dr. C. C. Delhommer of New Iberia, La., on December 7, 1911, in his fifty-seventh year. Deceased was a graduate of the Vanderbilt Dental College at Nashville, Tenn.

Dr. Robert R. Clendenen of Streator, Ill., November 24, 1911, in his thirty-sixth year. Deceased was a graduate of the Northwestern University Dental School at Chicago, Ill.

Dr. John L. Young of Rome, Ga., on November 7, 1911, from carbuncle. Deceased was a graduate of the Ohio College of Dental Surgery, Cincinnati, Ohio, and an author and artist of note.

Dr. Ermina Palmer Roe of Tarrytown, N. Y., on October 30, 1911, after prolonged illness, in her sixty-second year. Deceased was a graduate of the Philadelphia Dental College, and during the Richmond-Sheffield crown litigation was one of the most important witnesses for the dental profession, as she exhibited specimens of her gold crown and bridge work which antedated the crown patent by some ten years.

Dr. Cyrus M. Wright of Cincinnati, Ohio, on November 22, 1911, in his seventieth year. Deceased was a graduate of the Ohio College of Dental Surgery at Cincinnati, Ohio, and at one time president of the American Dental Society of Europe, the Mississippi Valley Dental Society, and the Ohio Dental Society, and professor of physiology and pathology in the Ohio College of Dental Surgery. He was also the author of "Practical Hints About the Teeth," and was very active in dental organizations.

SOCIETY NOTES AND ANNOUNCEMENTS.

CHAPIN A. HARRIS MEMORIAL FUND.

The committee appointed by the Maryland State Dental Association in charge of the Chapin A. Harris Memorial Fund call your attention to the desire on the part of the dental profession to commemorate in a suitable manner their appreciation of the services rendered by this distinguished man in the effort to elevate the profession of dentistry.

While not a Marylander by birth, his lifework was accomplished in this state, which was his home, and it was in the city of Baltimore that he established the first dental school, thus making dentistry a profession.

Connecticut has recognized and honored the name of Horace H. Hayden, a co-worker with Harris, by erecting a handsome monument to his memory at Windsor.

We are now asking contributions from dental societies, colleges, and members of the profession at large, to aid in erecting a suitable monument to the memory of Chapin A. Harris, the Founder of Professional Dentistry.

Those wishing to contribute will kindly send to Dr. H. A. Wilson, treas., Calvert Bank Bldg., Baltimore, Md.

W. G. Foster, *Chairman,*
W. W. Dunbracco, *Sec'y,*
M. G. Sykes,
B. Holly Smith,
T. O. Heatwole,
J. W. Smith,
H. A. Wilson, *Treas.*

"TRANSACTIONS" OF THE FIFTH INTERNATIONAL DENTAL CONGRESS.

Official Report of the Berlin Meeting Open to Purchase.

The mailing of the official Report of the Fifth International Dental Congress, Berlin, August 23–28, 1909, to members, has taken place. Some copies left for disposal after the members have been supplied are offered at 25 marks per copy as long as the stock may last.

This publication consists of two volumes, containing 1414 pages of printed matter, with over 700 illustrations, and practically constitutes an exposition of modern scientific dental surgery.

Orders are requested to be sent as soon as possible, with names and addresses attached, to the publishers, Schmitz & Bukofzer, Berlin C., Rosenthaler Strasse 26.

For the Organization Committee.

Shaeffer-Stuckert, *General Sec'y.*

AMERICAN DENTAL SOCIETY OF EUROPE.

The thirty-ninth annual meeting of the American Dental Society of Europe will be held at the Palace Hotel, in Brussels, April 5, 6, and 8, 1912. An interesting program will be furnished, and a cordial invitation is extended to members of the profession to be present.

Geo. H. Watson, *Hon. Sec'y,*
Pariser Platz 7, Berlin, Ger.

CANADIAN DENTAL SOCIETY AND ONTARIO DENTAL ASSOCIATION.

Union Meeting.

A union meeting of the Canadian Dental Society and Ontario Dental Association will be held at Hotel Brant, Hamilton, Ont., June 3, 4, 5, and 6, 1912.

J. A. C. Hoggan.

PIEDMONT (S. C.) DISTRICT DENTAL SOCIETY.

The next regular tri-annual meeting of the Piedmont District Dental Society will be held in Piedmont, S. C., March 26, 1912. All of the time will be devoted to clinics with the exception of a short business meeting, at which anyone who wishes may ask the society such questions as, How do you treat abscessed deciduous teeth? or, How would you treat a tooth with a Richmond crown cemented to position with an abscess under it? etc.

Clinics will begin promptly at 9 a.m.

W. Busey Simmons, *Sec'y-Treas.*

IOWA STATE DENTAL SOCIETY.

Golden Anniversary.

The fiftieth annual meeting of the Iowa State Dental Society will convene at Des Moines, Iowa, May 7, 8, 9, and 10, 1912, beginning Tuesday, May 7th, at 9 a.m.

The Coliseum, with its large floor space, has been secured for clinics, exhibits, and lectures.

A special effort is being made to have all the old members who are alive present, and Thursday will be given over to the older dentists and ex-Iowa practitioners as a homecoming event, to exhibit, lecture, clinic, and banquet, and all are urged to attend. An historical paper is being prepared by Dr. J. B. Monfort of Fairfield, and pictures of early practitioners will be shown. This we expect to be one of our most interesting days.

The exhibits will be the largest ever given by any state society. Complete and extensive modern dental equipments, appliances, and instruments will be shown and demonstrated. And in contrast a large exhibit will be made of equipment appliances, instruments, etc., of fifty years ago, that will be highly interesting and educational, and will be in charge of Dr. A. D. Clark of Charles City, Iowa, who would be pleased to correspond with anyone who might add to this exhibit. The modern exhibits will be in charge of Dr. H. A. Elmquist, master of exhibits, Des Moines, Iowa, to whom application for space should be made at an early date.

Further information will be furnished upon request from ethical practitioners of other states contemplating a visit to the meeting and to whom we extend a cordial invitation.

C. M. Kennedy, *Sec'y*,
605 Citizen's Nat'l Bank,
Des Moines, Iowa.

NEW YORK STATE DENTAL SOCIETY.

The forty-fourth annual meeting of the New York State Dental Society will be held at Albany, N. Y., in the Hotel Ten Eyck, May 9, 10, and 11, 1912.

Instructive papers have been secured, and the Clinic Committee will unquestionably present a fine list of clinics. (No clinics will be honored after March 20, 1912.) A special effort in behalf of exhibitors—for their comfort and sufficient space for exhibits—will be made by the Exhibit Committee. Address at once Dr. O. J. Gross, Schenectady, N. Y.

A cordial invitation is extended to all ethical dentists.

A. P. Burkhart, *Sec'y*,
52 Genesee st., Auburn, N. Y.

G. V. BLACK DENTAL CLUB.

Abandonment of Annual Clinic.

It is with regret that the G. V. Black Dental Club of St. Paul, Minn., announces that it will be unable to hold its annual clinic in February 1912. Illness of some of the members, and of others whom we expected to help us, makes it necessary for us to take this action.

R. B. Wilson, *Sec'y*,
206-8 Lowry Bldg., St. Paul, Minn.

KANSAS STATE DENTAL ASSOCIATION.

The forty-first annual convention of the Kansas State Dental Association will be held in the city hall at Salina, Kans., April 23, 24, and 25, 1912.

S. S. Noble, *President*,
Wichita, Kans.

ILLINOIS STATE DENTAL SOCIETY.

THE forty-seventh annual meeting of the Illinois State Dental Society will be held at Springfield, May 14, 15, 16, and 17, 1912.

J. F. F. WALTZ, *Sec'y*,
Decatur, Ill.

SOUTH DAKOTA STATE DENTAL SOCIETY.

THE thirtieth annual meeting of the South Dakota State Dental Society will be held at Sioux Falls, May 14 and 15, 1912. Adoption of a new constitution and by-laws will take place at this meeting.

J. D. DONAHOE, *Sec'y*.
Sioux Falls, S. D.

INDIANA STATE DENTAL ASSOCIATION.

THE next annual meeting of the Indiana State Dental Association will be held at the Claypool Hotel, Indianapolis, Ind., May 21, 22, and 23, 1912. The association has adopted as the slogan for this meeting—"1000 members in 1912." New and original plans have been perfected to make this meeting the banner meeting of our history.

OTTO U. KING, *Sec'y*,
Huntington, Ind.

EASTERN DENTAL SOCIETY OF THE CITY OF NEW YORK.

A MEETING of the Eastern Dental Society of the City of New York took place on Thursday evening, October 19, 1911, at Café Boulevard, 156 Second ave., New York city, Dr. William J. Lederer presiding. The meeting was well attended, and special attention was given to general anesthesia. The following papers were read: Alfred M. Hellman, M.D., "General Anesthesia." Maurice Green, D.D.S., "Ethyl Chlorid." Harry G. Nolan, D.D.S., "Somnoform." R. C. Coburn, M.D., "Nitrous Oxid."

The chairman, Dr. William J. Lederer called on Dr. Martin W. Ware to discuss the papers read during the evening. While praising some of the properties of the anesthetics under discussion, Dr. Ware strongly opposed somnoform, and was supported by the other discussers, with the exception of Dr. Nolan, who defended somnoform. A very interesting specimen was shown by Dr. M. Schneer, namely, a rare cyst in the region of the lower left molar.

AT a meeting of the society held December 7, 1911, the following officers were elected for the year 1912: William J. Lederer, president; Mark A. Schwartz, vice-president; Victor Ettinger, treasurer; Arnold LeWitter, financial and corresponding secretary. Committee on Admission—Louis Startz and Samuel R. Mishkin. Executive Board—Drs. Heimlich, Schneer, Ettinger, Startz, and Hindes.

A. LEWITTER, *Sec'y*.

W. D. MILLER CLUB OF PITTSBURGH.

THE W. D. Miller Dental Club of Pittsburgh, Pa., at their last meeting, held on December 5, 1911, elected the following officers for the ensuing year: J. N. Katz, President; A. Belber, vice-president; G. P. Goldman, secretary and treasurer.

GEORGE P. GOLDMAN, *Sec'y*.

NEW JERSEY STATE DENTAL SOCIETY.

OFFICERS AND COMMITTEES.

FOLLOWING are the officers and committees of the New Jersey State Dental Society for 1911–12:

Officers—W. W. Hawke, Flemington, president; Moore Stevens, Atlantic City, vice-president; Henry A. Hull, New Brunswick, treasurer; Chas. A. Meeker, Newark, secretary; Herbert S. Sutphen, Newark, assistant secretary.

Executive Committee—Moore Stevens, Atlantic City, chairman; Wentworth Holmes, Newark; M. R. Brinkman, Hoboken; Paul Beam, Netcong; Robert Roessler, Hoboken.

Membership Committee—J. S. Vinson, Newark, chairman; Nathan Bornstein, Newark; Hugh Fox, Newark; F. P. Luckey, Paterson; Oscar Adelberg, Elizabeth.

Essay Committee—Wentworth Holmes, Newark, chairman; David G. Baker, East Orange; C. S. Stockton, Newark; Raymonde Adair Albray, Newark; Frank G. Gregory, Newark; Franklin P. Luckey, Paterson.

Clinic Committee—M. B. Brinkman, Hackensack, chairman; S. C. C. Watkins, Montclair; Newton A. Bornstein, Newark; T. Starr Dunning, Paterson; Frank L. Hindle, New Brunswick; C. A. Coppinger, Jersey City.

Exhibit Committee—Moore Stevens, Atlantic City, chairman; Robert Roessler, Hoboken; George Emery Adams, South Orange; Julius C. Feiner, Newark; Harry Mayer, Newark; W. L. Fish, Newark; Walter F. Farr, Hackensack.

Committee on Affiliation with the National Dental Association—Paul F. Beam, Netcong, chairman; W. L. Fish, Newark; Stephen J. Barrett, Morristown; John B. Keller, Paterson.

Committee on Free Dental Clinics, to Work in Conjunction with the State Board of Education—Alphonso Irwin, Camden, chairman; T. D. Van Syckle, Princeton; J. E. Duffield, Camden; C. W. F. Hoblitzell, Jersey City; C. A. Rice, Passaic; Emanuel Vexler, Newark; George C. Young, Harrison; Angelo Zabriskie, Paterson.

Committee on Ethics—B. F. Luckey, Paterson, Chairman; C. S. Stockton, Newark; George Emery Adams, South Orange.

Clinical Conference Committee—Harry Mayer, Newark, chairman; A. R. Eaton, Elizabeth; Oscar Adelberg, Elizabeth; J. S. Voegtlen, Newark; Hector Irick, Trenton.

Materia Medica Committee—Walter Woolsey, Elizabeth; Geo. B. Lutz, Atlantic City; H. J. Marashlian, Jersey City; Laurence Mundy, New Brunswick.

Permanent Committee on Oral Hygiene—Paul F. Beam, Netcong, chairman; Joseph S. Vinson, Newark; W. L. Fish, Newark; Stephen J. Barrett, Morristown.

Arts and Invention Committee—W. E. Stelle, Plainfield, chairman; E. L. Wharton, Newark; A. J. Torrilhon, W. Hoboken; John A. Watts, Nutley, Geo. V. W. Voorhees, Somerville.

Committee on Registration—Harvey Iredell, New Brunswick, chairman; A. J. Torrilhon, W. Hoboken; Geo. C. Young, Harrison.

Electrical Supervision—Harvey Iredell, New Brunswick, chairman.

Contracts and Programs—Charles A. Meeker, Newark, chairman.

Prosthetic Dentistry—Horace I. Beemer, Newton, chairman; Veranus M. Rundle, Newton.

ARMY DENTAL SURGEONS.

Memoranda of Changes in Stations and Duties.

For the week ending December 16, 1911:

F. F. Wing, December 8th, left from temporary duty at Fort Mackenzie, Wyo., on twenty-five days' leave of absence.

R. E. Ingalls, December 4th, reported for temporary duty at Fort Wm. H. Harrison, Mont.

John A. McAllister, Jr., December 13th, left Fort Leavenworth, Kans., *en route* to take station at Jefferson Barracks, Mo.

For the week ending December 22d:

John A. McAllister, Jr., December 14th, reported for duty at Jefferson Barracks, Mo.

James F. Feely (*act'g*), December 18th, relieved from duty at Fort Slocum, N. Y., and ordered to Fort Hamilton, N. Y., for duty.

Charles E. Sherwood (*act'g*), December 18th, relieved from duty at Columbus Barracks, Ohio, and ordered to Presidio of Monterey, Cal., for duty.

Frank P. Stone, December 17th, reports for temporary duty at Fort Oglethorpe, Ga.

For the week ending December 30th:

George E. Stallman, December 22d, reports arrival at Fort Bliss, Texas, for temporary duty.

James F. Feely (*act'g*), December 24th, reported for duty at Fort Hamilton, N. Y.; left Fort Slocum, N. Y., same date.

For the week ending January 6, 1912:

R. E. Ingalls, December 25th, left from temporary duty at Fort Wm. H. Harrison, *en route* to Fort Missoula, Montana, for temporary duty.

H. G. Voorhies, December 31st, reports as on duty at Fort Leavenworth, Kans., since December 21st.

C. E. Sherwood (*act'g*), January 2d, left Columbus Barracks, Ohio, *en route* to Presidio of Monterey, Cal., for duty.

R. E. Ingalls, December 23d, reports for temporary duty at Fort Missoula, Mont.

John D. Millikin, December 30th, leave of absence extended to and including March 4th.

For the week ending January 13th:

J. R. Bernheim, January 5th, left from temporary duty at Fort Benjamin Harrison, Ind., *en route* to station Fort Sheridan, Ill.

Franklin F. Wing, January 2d, returned to temporary duty at Fort Robinson, Nebr., from leave of absence.

George L. Mason, January 8th, left from temporary duty at Fort Crook, Nebr., *en route* to Fort Des Moines, Iowa, for temporary duty.

George E. Stallings, January 6th, left from temporary duty at Camp Fort Bliss, *en route* to Fort Clark, Texas, for temporary duty.

EXAMINATION OF DENTISTS FOR THE ARMY.

The Surgeon-general of the army announces that examinations for the appointment of acting dental surgeons will be held at Fort Slocum, N. Y., Columbus Barracks, Ohio, Jefferson Barracks, Mo., Fort Logan, Colo., and Fort McDowell, Cal., on Monday, April 1, 1912.

Application blanks and full information concerning these examinations can be procured by addressing the Surgeon-general U. S. Army, Washington, D. C.

The essential requirements to securing an invitation are that the applicant shall be a citizen of the United States, shall be between twenty-one and twenty-seven years of age, a graduate of a dental school legally authorized to confer the degree of D.D.S., and shall be of good moral character and habits.

Acting dental surgeons are employed under a three-years' contract, at the rate of $150 per month. They are entitled to traveling allowances in obeying their first orders, in changing stations, and in returning to their homes at termination of service. They also have the privilege of purchasing certain supplies at the army commissary. After three years' service, if found qualified, they are promoted to the grade of dental surgeon, with the rank of first lieutenant, and receive thereafter the pay and allowances appertaining to that rank.

In order to perfect all necessary arrangements for the examination, applications must be in the possession of the Surgeon-general at least two weeks before the date of examination. Early attention is therefore enjoined upon all intending applicants. There are at present twenty-nine vacancies to be filled.

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UNITED STATES PATENTS

PERTAINING OR APPLICABLE TO DENTISTRY

ISSUED DURING DECEMBER 1911.

December 5.

No. 1,010,896, to Harry B. Gregory. Tooth for bridge work and crown work.

December 12.

No. 1,011,239, to Oscar H. Pieper and A. F. Pieper. Dental engine.

No. 1,011,240, to Oscar H. Pieper and A. F. Pieper. Electrical controlling apparatus.

No. 1,011,597, to Bernard Fischler. Dentist's soldering tool.

December 19.

No. 1,012,401, to Piercy B. McCullough. Dental swaging apparatus.

December 26.

No. 1,012,613, to Wm. P. DeWitt. Saliva ejector.

No. 1,013,028, to Thacker E. Lee. Investment cup.

No. 1,013,089, to Edgar G. Hubbel. Toothbrush.

DR. GEORGE G. MILLIKEN.

THE

DENTAL COSMOS.

VOL. LIV. MARCH 1912. No. 3.

ORIGINAL COMMUNICATIONS.

(I.) A GROUP OF DEFORMITIES OF THE NASAL RESPIRATORY TRACT, COINCIDENT WITH DENTAL IRREGULARITIES.

(II.) A NEW INSTRUMENT FOR COMPARATIVE MEASUREMENTS,

Demonstrating Changes in Nasal Fossæ when Readjusting the Maxillary Arch.

By GEO. H. WRIGHT, D.M.D., Boston, Mass.,

LECTURER ON ORAL HYGIENE, HARVARD DENTAL SCHOOL; ASSISTANT IN LARYNGOLOGY, HARVARD MEDICAL SCHOOL; ASSISTANT TO PHYSICIANS, NOSE AND THROAT DEPARTMENT, MASSACHUSETTS GENERAL HOSPITAL.

(Read before Section III of the National Dental Association, at its annual meeting, Cleveland, Ohio, July 27, 1911.)

A CONTRIBUTION in the DENTAL COSMOS for June 1911, entitled "A Study of the Maxillary Sutures," constitutes a basis for study of the underlying and fundamental bones involved in maxillary readjustment, and a brief synopsis of that paper at this time will not be out of place as an introduction to a better understanding of the internal structures of the nose, and the measurements to be made within the nose before and after expanding the dental arch. A study of the first paper is recommended as a means of better understanding the present report.

A STUDY OF MAXILLARY SUTURES.

We considered the palate, malar, orbit, nasal, ethmoid, and lacrymal bones, their processes and articulations. This led us to an appreciation of the various sutures involved. Let us note particularly the transverse facial suture, and also what a suture implies. When ossified it is no longer a true suture, although its former outline may be defined. Unossified, the suture has between its parts a fibrous connective tissue, capable of having its fibers stretched, with regenerated growth and subsequent ossification; and because this is so, the orthodontist is capable of assisting nature in the normal lines of growth, and thereby obtaining such remarkable results as are shown in the enlarged arch. It is necessary for us to reconsider the anatomy and histology of the turbinal.* This review of the anatomy and histology enables us to appreciate how variations from its normal position and structure may modify nasal respiration. Let us examine the internal nose in conjunction with these deformities, as a matter of record for future observation. Whenever we make an examination of the nose by means of the head mirror, reflected light, and a nasal speculum, we may note what structures vary from the normal, and make a record accordingly—as, for instance, of a deviation of the septum, collapsed nares, too close approximation of the turbinals to the septum or floor of the nose, etc. In order to do this effectively, it may be and frequently is necessary to cocainize the intranasal region to induce shrinkage of the mucous membrane, in order to obtain an unobstructed view.

Some of these obstructions are active for brief periods only, and as they appear suddenly, so they disappear spontaneously, often without treatment. Therefore the class of nasal obstructions which we shall examine are those which make their appearance gradually, with increasing obstruction to good breathing. This class is more likely to be associated with the almost imperceptible but steadily progressive dental deformity, and in either region, the nose or the mouth, there is no hope for a spontaneous cure.

PRACTICAL CASES.

A description of a few of the many practical cases which we have examined, measured, corrected, and finally examined and measured again, will indicate without too much repetition the value of this work, and incidentally suggest a wider field for future study.

Dr. H. P. Mosher ("American Practice of Surgery," vol. vi) reports the examination and measurement of fifty skulls with a view of determining the operating distances to the sinuses. In this series he found an average antero-posterior depth of two inches from the lower edge of the posterior rim of the nasal opening to the choanæ along the floor of the nose, and with all other diameters, vertical, horizontal, and oblique, the variability was dependent upon the age, size, shape, and individual anomalies, as well as the racial type of the skull. So, too, in all measurements which we have made upon the living these factors are variable, and consequently we are forced to confine our estimates of change to a comparative measurement for each individual problem of nasal constriction or obstruction. (See Fig. 1.)

Case I. This was that of a boy of twelve years. The anterior upper incisors were in malocclusion, the laterals in lingual occlusion to lower teeth and irrevocably locked inside the arch. The premaxillary bone was small, but the teeth in it were well developed. Both anterior nares were collapsed and acted as valves with each inspiration of air. (Fig. 2, A.) The upper arch was contracted in the region of the bicuspids. The internal nose showed approximation of the lower turbinals to the septum, which deviated slightly above and below, making a double curve. There were no spurs or thickenings or otherwise marked disease conditions of the mucous membrane, except a slight redness and swelling. The boy could not breathe freely through the nose, and with difficulty could run fifty yards without much panting and heavy breathing through the mouth. His general condition was poor, his color anemic, and the patient altogether lacked stamina; was subject to frequent nasal colds. The distance between the antral walls below the lower turbinals before regulating the teeth was 10 mm., and after regulating, 16 mm.; between the first bicuspids before regulating, 23 mm., after regulating, 33 mm. After readjustment and obtaining good occlusion, the nose when examined showed the nares in good tone as compared with the former collapsed condition; the deviations of the septum were gone, and the turbinals were in relatively good position away from the septum and slightly raised from the floor of the nose, and there was no difficulty in nasal respiration. (See Fig. 2, c.)

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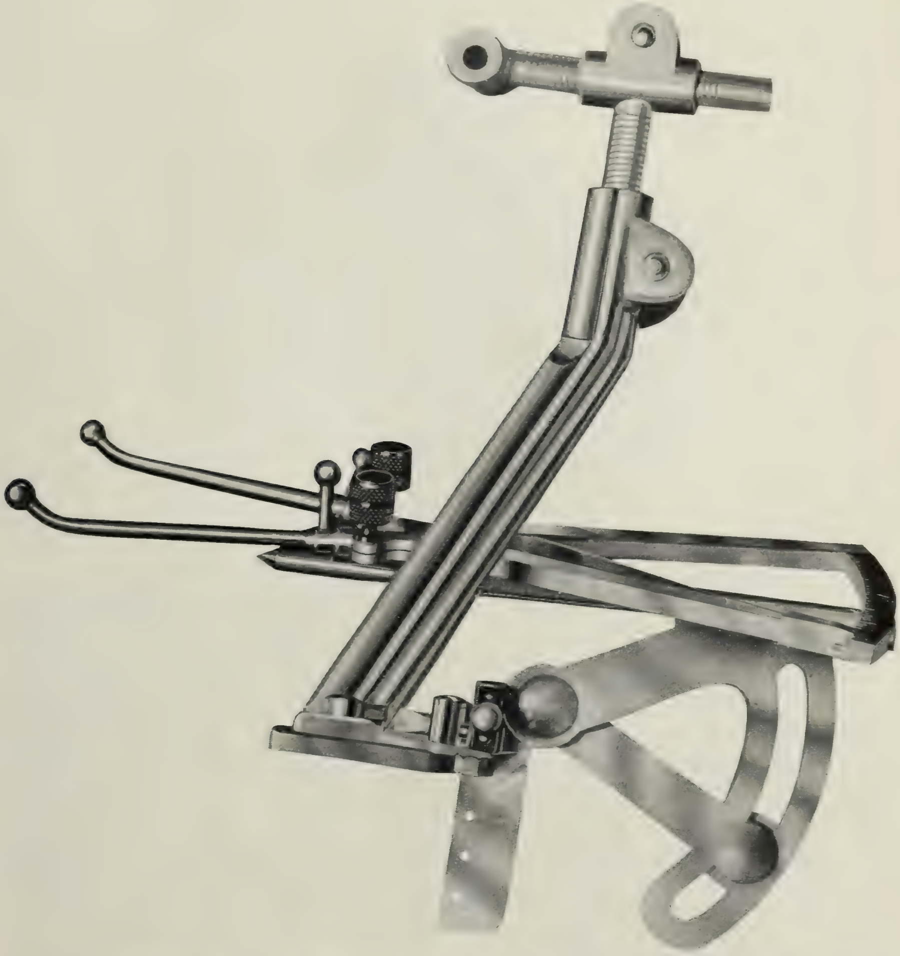
* (*a*) "A Contribution to the Secreting Mechanism of the Nose," by J. L. Goodale, *Annals of Otology, Rhinology, and Laryngology*, March 1905.

(*b*) Pilliet, "La Muqueuse des Fosses nasales et son Tissu erectile," *Tribune Médicale*, May 14, 1891.

Case II was that of a man of twenty-seven years. This patient presented a long and narrow face, a high, contracted, and V-shaped arch, and teeth in badly decayed condition. He was a mouth-breather and subject to head colds, and was below the normal in weight. The insurance companies had refused him insurance, considering him as a bad risk. A rhinologist, Dr. C. A. Coolidge, Jr., sent him to us, saying that he hesitated to operate on the lower turbinals where the dental deformity was so marked. For a period of three months we stretched the maxillary sutures, at the end of which time the incisors had moved apart, and, to his great joy and relief, the patient

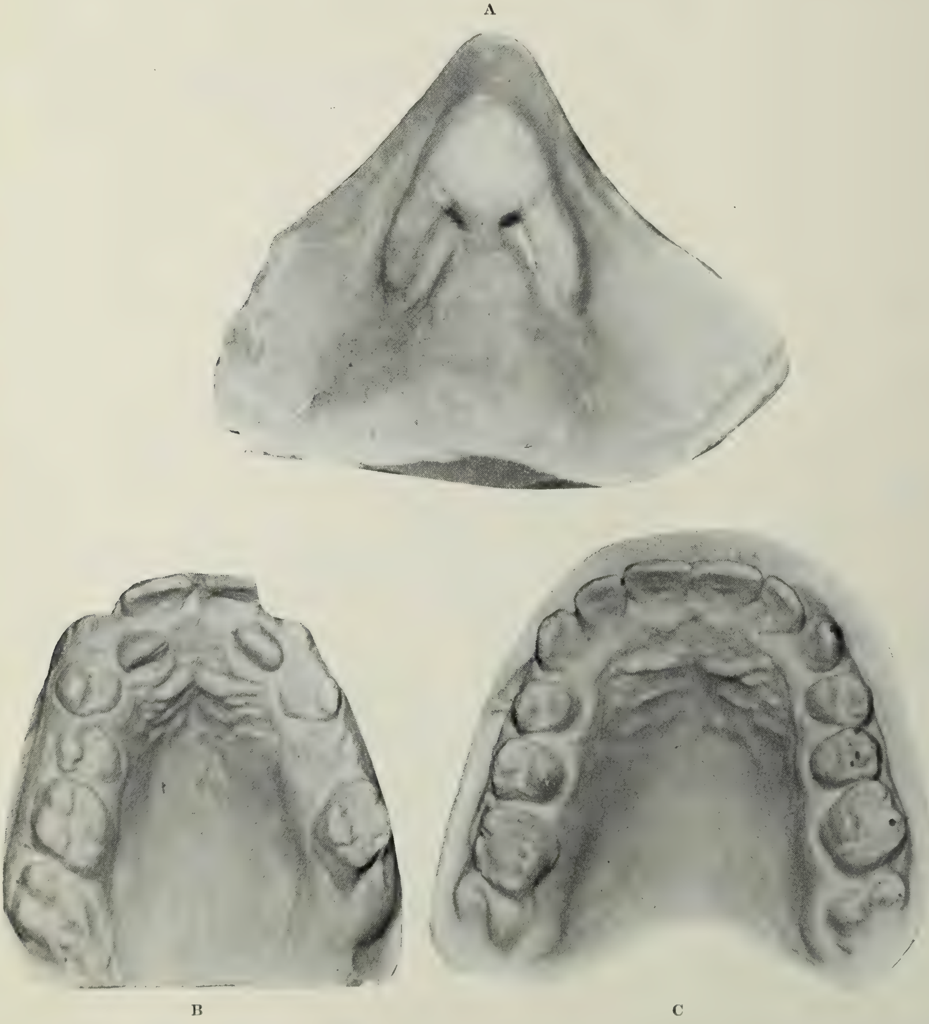
Fig. 1.



Author's instrument for recording internal width of nose between antral walls.

reported freedom in nasal breathing. It took me another fifteen months to adjust his teeth, during which time the patient's health improved in every way. The measurements between the antral walls before adjustment were $8\frac{1}{2}$ mm.; after adjustment, 15 mm.

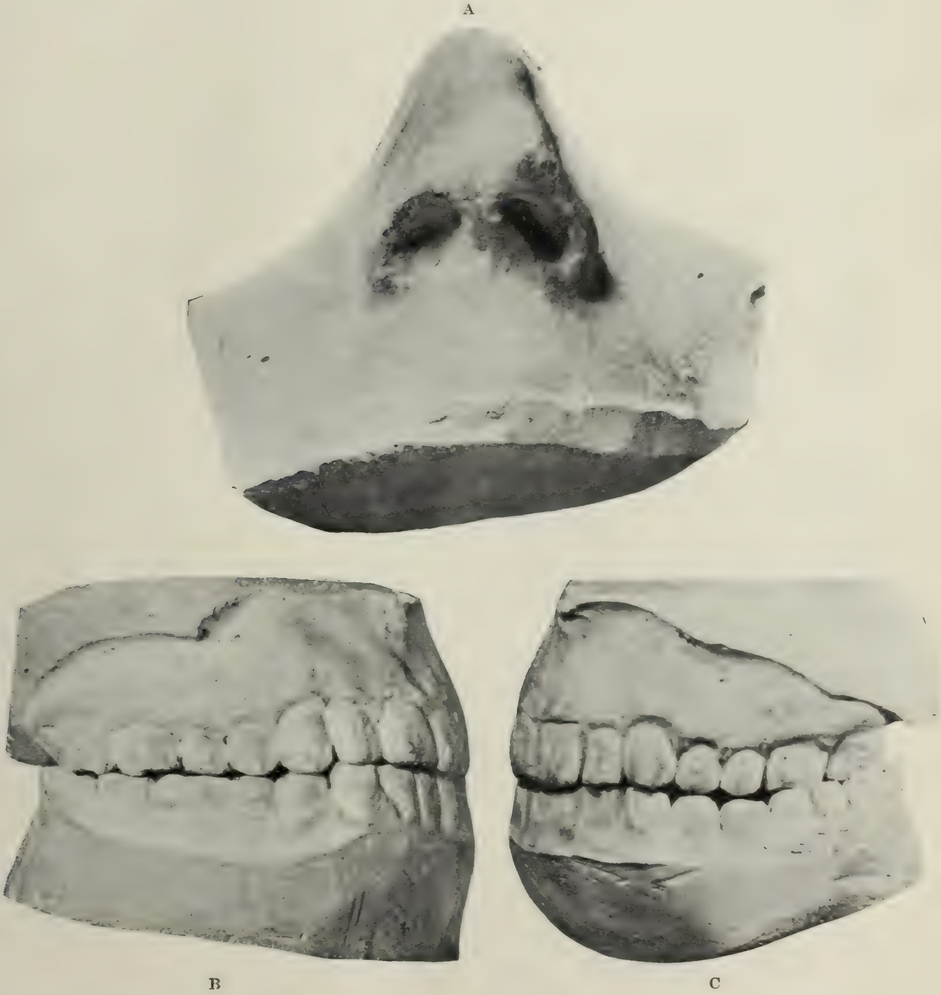
Fig. 2.



A, Showing collapsed anterior nares. B, Contracted dental arch and anterior deformity. C, Corrected arch, which resulted in wider nares.

Case III was that of a girl of eleven years. The abnormality of teeth was not serious. There was a slight contraction in the region of the bicuspids. The arch was tending to the Gothic type. The turbinals on both sides were near the floor of the nose, and the measure of ease in breathing through the nose was variable, the patient being subject to nasal or head colds. We were impressed with the idea that, with a little attention given to tooth regulation, by simply keeping the patient under observation and applying gentle force in maxillary expansion to lead the arch out to normal, nature would complete the growth, and soon establish normal conditions within the mouth as well as in the nose. The measurements within the nose before treatment showed 12 mm.: after treatment, 14½ mm. The turbinals were lifted from the floor of the nose; the floor assumed a declination of 2°, and good nasal breathing-space was established. This case represents what we are pleased to designate as the unearned increment in maxillary growth and readjustment. We must recognize and credit to nature what she accomplishes in normal growth and expansion, and not assign to our apparatus all the glory. (See Fig. 3.)

Fig. 3.



A, Nares on right side normal. B, Right central incisors to molars in good expansion. C, Left lateral incisor to last molar in lingual occlusion. This dental deformity showed asymmetry up to floor of orbit.

Dr. George Ainsworth of Boston told us of a case in which he was called upon to spread an arch that was comparatively uniform but narrow. The upper teeth on one side stood inside of the lower teeth, instead of occluding properly. The patient went to Canada for the summer, with an appliance in place. On his return in the fall, Dr. Ainsworth found that the dental arch had spread fully three-fourths of an inch, one-third more than was desired, and, as the patient, a lad of thirteen or fourteen years, expressed it when asked about his breathing through his nose, "It felt as though the north wind was blowing through as compared with what it was before."

NASAL DEFORMITIES COINCIDENT WITH DENTAL IRREGULARITIES.

We are able to cite and report many other cases of different ages and types, as we have up to date records of thirty or more cases. The significant facts are these: All these cases show some nasal deformity coincident with a dental irregularity. They all show a change in the width between the superior maxillary bones, measured between the antral walls below the turbinates, as recorded before and after regulation respectively. They all show improvement, some slightly and others in a marked degree, in intranasal respiration after maxillary readjustment, and in consequence enjoy a better nasal sanitation, ventilation, and drainage, better nasal respiration, and greater freedom from head colds. The factor of restored facial symmetry must not be lost sight of, although personally I am more inclined to emphasize, first, the importance of normal function of the mouth and nose, believing that, when this is secured, all other beauty and harmony will inevitably follow.

INFLUENCE OF MAXILLARY CHANGES ON THE EYE.

As an outlook toward the future, we shall cite a short statement by Dr. Wm. F. Daly, oculist, of Boston, with reference to these maxillary changes. The outlook, I believe, is pregnant with great things for the future, namely, the influences of maxillary readjustment upon the orbit. We have already studied the sutures of the orbit with the object of showing that any movement of the base of the superior maxillary bone—which, broadly speaking, is a triangle—must cause a movement of its apex, which is in the region of the floor and inner canthus of the eye, and this movement must induce ocular changes. Dr. Daly says:

> A train of ills associated with the growing period of the human face is found in the eye and its adnexa. Among such common troubles, not to point out their far-reaching sequelæ, may be mentioned the different abnormal refractive conditions—the various heterophorias and more pronounced anomalies of muscular dynamics, with resultant loss of vision of one eye in a large percentage of cases.
>
> These conditions have all been explained on various bases, and opththalmic literature teems with complicated theory, with the result that sides are taken, schools and camps formed.
>
> Each new text-book in point of thoroughness carefully perpetuates old error, and in their reading both practitioner and student meet with a mass of conflicting evidence. Witness the war that waged for years, and for which even now no solution is found, concerning whether the poor vision of an amblyopic eye with a normal fundus is due to an acquired partial blindness from disuse, or whether there was an original congenital lack. The theories of amblyopia exanopsia (sive ablepsia) and Schweigger's counter theory of congenital amblyopia still find their adherents, and at least as far as text-book theory is concerned are as far from solution as ever. Like mistaken theory has given a decade of ruthless eye-muscle cutting, the futility of which, unless perhaps in an exceptional case, is recognized now by the profession at large.
>
> In looking for causation for all such conditions, the search for the occult has caused the obvious to be overlooked.
>
> A hitherto almost wholly unrecognized part among the etiological factors of heterophoria, amblyopia, and their train has been played by the bony orbit, and farther back by the factors which modify its formation. The average ophthalmic system or text-book recognizes this in but a trifling number of instances, whereas the exception is a rarity. Indeed, supporting any such view of orbital modification of ocular condition, one has but to review mentally the long-accepted ethnic

facts concerning refraction—the brachycephalic Celt is hypermetropic as a nation, and the Teuton is myopic.

Highly important, if not pre-eminent in the modification of the shape of the orbital cavity, and consequently of the growth and function of the orbital contents, is the relation of the premaxilla during the plastic years. The wedge which thrusts a broad-based pyramid out and its apex in must of necessity modify markedly the cavity of which the pyramidal apex formed the inner and under walls.

When we consider that apart from all preconceived theories of origin, all heterophorias, squints, and amblyopias found coincident with heterophoria, make their appearance during the first six years of life, the period during which the wedge is either driven or not, is either faultily placed or negligently allowed to place itself, the intimate relationship of the conditions, their development *pari passu*, their intolerance of correction in later life, and other points in common, become strikingly significant.

Typifying this dependence of orbital malformation upon certain phases of facial maldevelopment may be instanced the half-apologetic and extenuating statement which ophthalmologists of any clinical experience have heard hundreds of times from mothers who present their children with beginning of developed squint: "Doctor, he was not born so."

A report will be made later concerning the relationship in these cases of maxillary readjustment, of orbital measurement, growth, refractive, and muscular conditions. A number of cases are at hand, but because of their numerical insufficiency or because of faulty record they will not now be presented. It is hoped, however, by stating in advance the lines along which the work is being done, with an extended report later, to point the way to research which cannot but bear heavy fruit.

Measurements.

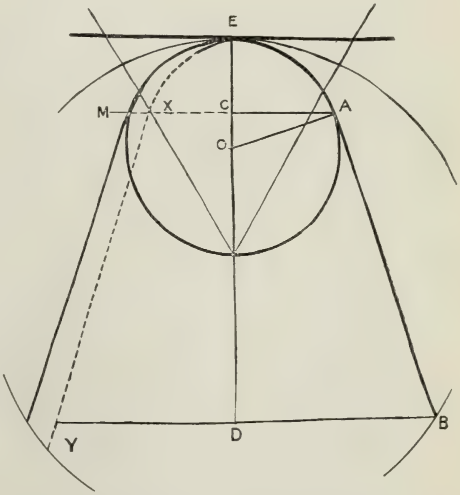
In order to round out and complete the study, we beg indulgence while we consider the mathematics for—

First: Determining the area of loss in mastication. (See Fig. 4.)

Second: Determining the area of loss to respiration, when the anterior nares are in a state of collapse.

We have availed ourselves of the work of Dr. Bonwill and the subsequent elaboration by Dr. Hawley, whose formula for finding the extent of the normal arch is given in Johnston's "Operative Textbook." With this formula we have analyzed the component parts of the arch, and the lettered diagram (Fig. 4) will indicate briefly the method used to obtain the results.

Fig. 4.



Author's diagram for analysis of the dental arch when deformed. Method for determining area of loss in mastication shown between outer line and inner dotted line.

From A, the point of tangency, drop a perpendicular to E D. From B drop a perpendicular to E D. A C D B is then a trapezoid, the area of which is $\frac{\text{C D}}{2}$ (A C + B D).

The area of E C A is then found as a semi-segment of the circle with known radius, O A.

We first secured good impressions in plaster both of the teeth and of the nose. Then, using Hawley's formula for determining the normal arch from the combined lateral diameters of the central, lateral, and canine, we constructed the geometrical figure that you are familiar with.

To this figure we added an outline of the dental deformity from the cast itself, which was carefully checked by measurements from the teeth within the mouth. One-half of the teeth being in normal occlusion, we wished to determine the area loss of mastication for the other half. The method employed for this purpose was as follows:

The area of the abnormal half is found by first finding the area of C X Y D as $\frac{CD}{2}(CX + YD)$, then the area of E M X was approximated, and subtracted from the area found from the semi-segment E C A. This small area was found by considering it as a triangle, with the base M X, and the altitude of the portion of the circumference E X. It was then checked as carefully as possible by counting the individual squares of the co-ordinate paper. The difference between the normal and the abnormal half was found, on the co-ordinate paper, to be 128 mm. square. The difference between the normal and abnormal nares was 60 mm. square.

This brief outline is given as a suggestion of the method followed; if we attempted to give all the figures in the work, it might prove confusing. The results are what we want.

The nares were plotted on co-ordinate paper by making measurements on the plotted model from the median line and laying off the same distance on a given line on the paper, also verifying these from measurements on the living subject. A sufficient number of points were taken to make the apparent outline of the curve.

In approximating the areas, the normal breathing-space was considered as an ellipse, its area being found according to the formula, where A and B are the semi-major and the semi-minor axis. In the abnormal area it varies considerably from an ellipse by being flattened and at the same time indented.

The minor axis was necessarily only a rough approximate. The area, however, thus found was carefully checked by counting the number of small squares of the co-ordinate paper included by the curves, and then estimating the fractions of the squares as nearly as possible.

Variations in width of the horizontal line between the antral walls in skulls of different types in adults where no appreciable dental deformity exists show from 10 to 15 mm. at the entrance or the anterior third below the lower turbinal on the antral wall; thence backward toward the middle of the nasal fossa it widens and shows a range of from 12 to 18 mm.; it then decreases rapidly until we reach the choanæ, where Coakley gives the vertical height for an average range of from 1 to $1\frac{1}{4}$ inches, and the antero-posterior diameter along the nasal floor as from $1\frac{3}{4}$ to 2 inches.

In any event these measurements are only approximate—as they vary, as the cephalic index varies, with the racial and facial types and admixtures, as well as with individual abnormalities.

Therefore at this time the principal value in our measurements of the intranasal space lies in the determination of the actual amount gained for each individual, and in knowing where that change occurs and recognizing its immediate effect on the organization as a whole.

The author wishes to acknowledge his indebtedness to Mr. Geo. W. Bowers for his care in constructing the measuring instrument, and to Dr. Arthur E. Joslyn, of the Harvard Medical School, for assistance in computing the areas.

PYORRHEA RETENTIONS AND DENTURES.

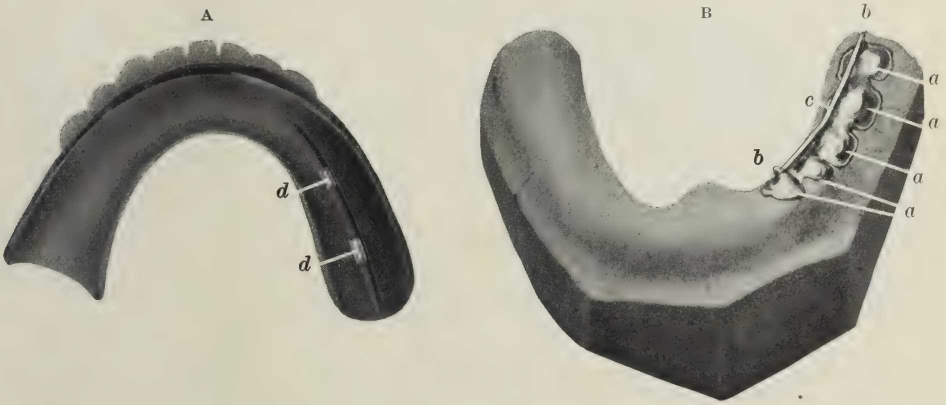
By CLARENCE J. GRIEVES, D.D.S., Baltimore, Md.

(Clinic given at the annual meeting of the Pennsylvania State Society, Scranton, June 29, 1911.)

ONE of the most difficult problems confronting us today is the fixed and cleanly retention of teeth the peridental and alveolar foundations of which have been destroyed to a certain degree by pyorrhea alveolaris. We are glad to note that the number of operators expert in pyorrhea surgery and prophylaxis is ever increasing, and it would appear that, while much is to be learned in regard to the systemic treatment of this disease, little more is to be desired as to its local treatment by scaling, except that these operators may numerically increase so that every community may have one.

There is hardly a pyorrhea case, however, in which certain teeth, having lost some of their foundation tissue, which can never be restored to its full function, do not need mechanical retention. It has been found that the union of otherwise damaged but clean roots of pyorrheal teeth with the sockets is quite rigid; in the very nature of the disease at this stage, no matter how perfectly prophylactic treatment be administered, the stress of occlusion, even if altered, will surely do permanent damage, and the patient, after having suffered the discomforts of pyorrhea surgery, will finally lose such teeth.

FIG. 1



It is at this stage of the disease when the most skilful retention is needed. The patient needs it to save his teeth; the pyorrhea operator needs it, lest the results of his work be lost, for the ultimate result rests in the hands of the operator who retains the case. Clinically speaking, therefore, this is one of the most important and difficult operations in the ever-increasing field of operative dentistry.

The usual forms of removable bridge and clasp plates are very rightly condemned by pyorrhea operators, for, while they may be removed, leaving the gingival third open for cleanliness, the very possibility of removing these appliances permits of a certain amount of lateral motion of the adjacent teeth or piers.

Fig. 2.

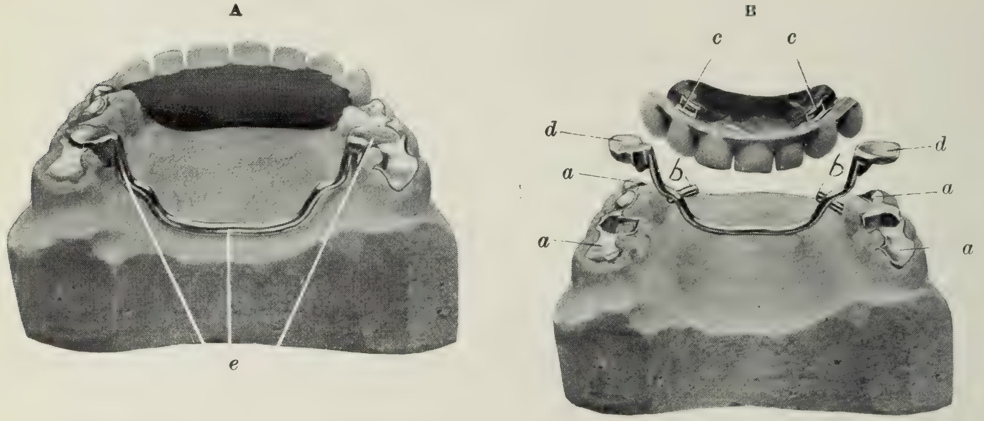
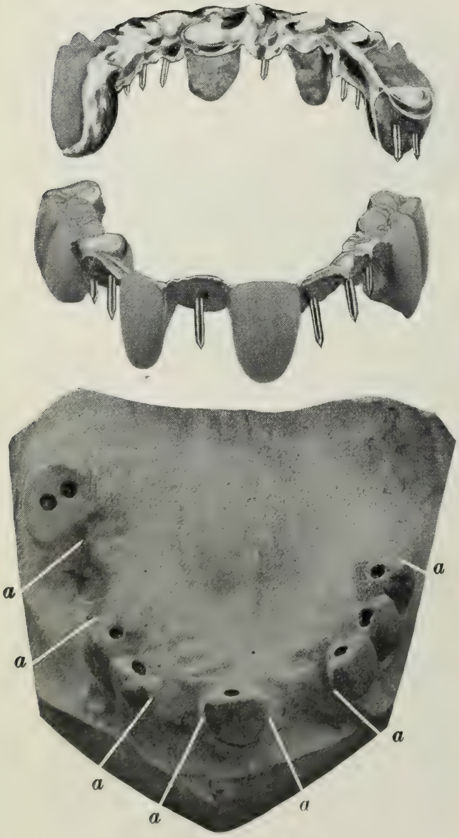


Fig. 3.



When these have been damaged by pyorrhea, they are as surely, though more slowly, destroyed as if the surgical treatment had never been undertaken.

The fixed bridge and the possible combinations thereof have for years offered valuable means for splinting and restoration, but they are open to censure, as they offer lodging-places for the accumulation and retention of inaccessible food débris, gingivally. Fig. 3 represents such a splint bridge, in the construction of which the greatest care has been displayed. The portions offering opportunities for the recurrence of gingival irritation will be noted at *a*. While pulp devitalization and extirpation are accepted as an important part of pyorrhea treatment, and while the fixation of remaining teeth is as important as pyorrhea surgery—all of these advantages being perfectly secured by this form of appliance—it is to be regretted that the results obtained with such an appliance are so imperfect, for recurrence of the disease invariably occurs.

Absolute fixation of all roots damaged by pyorrhea and restoration of lost dental organs by removable bridge work of such construction that all such parts as indicated by *a* may be accessible to the patient and operator can be surely and safely accomplished, according to the clinician's experience, by the appliances illustrated in Figs. 1, 2, and 3.

In Fig. 4 the splinted teeth were all quite loose, excepting the left molar. All pulps having been removed, an "inter-gold inlay" was arranged—see *a* and *b*—owing to the tipping of the tooth and the fact that the gingival bands usually employed for shell crowns are considered unsuitable in this work; shields and pins, as carefully adapted as inlays, were arranged at *c*, and on a carefully made cast were united by an iridio-platinum wire of from 16 to 17 gage. To a cast fitted with all of these parts, at *d* two of Dr. Steele Gilmore's clips were adapted, with flanges vulcanized into the entire removable piece. With the teeth sterile, the splint is covered with cement and guided to place by using the removable part as a carrier, and all edges are burnished as the cement sets. The resulting bridge, as illustrated in Fig. 4, insures great rigidity of the retained teeth. The occlusion and the expression are satisfactorily restored by this appliance, which may be removed at will by the patient or operator for the sake of cleanliness. It will be noted that the iridio-platinum wire is carefully curved away so as not to damage the gingival tissue at *e*, and stands far enough away from the ridge when set as not to cause hypertrophy. It may be cleansed by the use of floss silk.

Fig. 4.

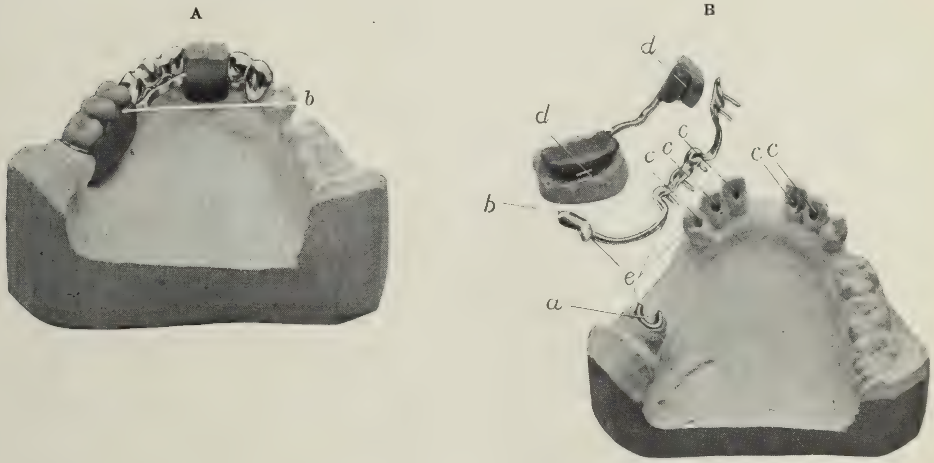


Fig. 2 shows a more complicated form of retention of very loose molars and bicuspids which were splinted after devitalization by a union of deep cast-gold inlays, to which union, at *b*, two extensions, $\frac{1}{8}$ inch long, of iridio-platinum wire were attached mesio-gingivally to the bicuspids, just above the edges. The anterior restoration was made to fit to these by two Gilmore clips at *c*. A collateral supporting bar of 14-gage iridio-platinum wire was attached to two inter-gold inlays, after the molar splints had been temporarily set, this bar barely missing the palatal and gingival tissues at *e*. The side splints are set with cement, using the restoration as a guide. Afterward, the palatal bar is set with Evans' crown and bridge gutta-percha, and may be removed at any time.

In Fig. 1 a series of very loose lower molar and bicuspid roots, after suitable treatment, were pin-capped and united at *a*. Over these caps extends, with slight turns upward at the first bicuspid and third molar at *b*, a from 16 to 17 gage iridio-platinum wire, *c*, to which is attached on a suitable cast a full lower denture, retained by Gilmore clips at *d*. Great rigidity is thus obtained for both roots and denture; the clips, the edge of which may be turned inward in case of loosening, are of gold alloyed to spring hardness, which wears well.

We would note the fact that good retention for a removable appliance may be constructed, without the use of clips, by giving the wire *c* and such extension as is indicated at *b* a square finish, extending it a little, and vulcanizing the denture over these on a cast. This appliance can then be removed, and set in place with cement. These features as applied to partial dentures, and the application of the Gilmore clips, have been fully described by Dr. Mills and Dr. Keeley, of Ohio, the reports of their clinics being very interesting.

IMPERFECTIONS IN THE DIAGNOSIS AND TREATMENT OF PATHOLOGIC CONDITIONS OF THE TEETH AND JAWS.

By **ROBERT H. IVY, M.D., D.D.S., Philadelphia, Pa.**

(Read before the Philadelphia County Medical Society, October 25, 1911.)

UNTIL within a comparatively recent time the oral cavity and its appendages the teeth, gums, and alveolar process, with their diseases, did not receive the attention to which their importance entitles them in relation to pathologic processes in the body at large. At the present time it is being slowly recognized that the mouth is an intrinsic part of the general economy. Much has been said recently, by William Hunter and others, on the part played by the mouth in the etiology of many constitutional diseases, on the importance of oral cleanliness in the treatment of general infections, and on the local manifestation within the mouth of disorders affecting chiefly other parts of the body.

These subjects are mentioned simply to emphasize their importance; I desire here particularly to speak of—(*a*) Our attitude toward dental and oral lesions; (*b*) The causes of this attitude, and (*c*) What can be done as a remedy.

DIVERGENCE OF THE MEDICAL AND DENTAL PROFESSIONS IN REGARD TO THE TEACHING OF PATHOLOGY.

The separation of the medical and dental professions has brought about a divergence in the teaching of pathology in the two schools. Dentistry, requiring as it does a large amount of skill and practice in purely mechanical operations, has been unable to devote sufficient time to the general study of pathology, and has evolved a pathology, and as its sequence a therapy, limited to its own particular field; consequently pathology as applied to dentistry has come to be regarded as a more or less separate entity.

The same general laws govern pathologic processes in all parts of the body, and while the use of the term "dental pathology" may be perfectly defensible, yet in the opinion of the writer it is best to avoid it, as it has tended only to isolate, in the minds of the majority of members of the two professions, lesions of the teeth and alveolar process from those of other parts of the body. The medical profession has accepted the special training of the dentist as sufficient to meet all cases involving the mouth, and has left this important portion of the body severely alone, treating it with more or less indifference, although all other specialties receive some consideration during the medical course. At the same time the physician reserves the right of final judgment of a particular case—or criticism of the dentist's treatment. Medical men lay no claim to any knowledge of the teeth and their diseases. The fault lies not so much with the individual physician as with the medical school, which during its course of instruction has not a word to say of the pathology of these important organs. Inasmuch as the mouth is an important part of the human body, just in the same proportion should students of disease be taught the pathology and to a certain extent the diagnosis of its lesions. The special technique required in the treatment of diseases of the teeth is, of course, to be left to the dental practitioner, just as that of ophthalmic, rhinologic, or gynecologic therapeutics is left to specialists in those branches.

On the dentist's side, the restriction of his education to the narrow field of the teeth and alveolar process, and the long period requisite to the acquirement of necessary manipulative skill, have tended to minimize the importance of studying general pathologic processes in relation to his specialty.

We can therefore say, in a general way, that the physician knows little of the lesions of the teeth, while the dentist is ignorant of general pathologic processes. The disastrous effects of such lack of knowledge are frequently seen in cases in which a little broader education on the part of the dentist, or less indifference to dental lesions by the physician, would have given a true interpretation of the signs and symptoms presented and a rational basis for treatment.

ERRORS OF PHYSICIANS DUE TO LACK OF DENTAL KNOWLEDGE.

How often, during a physical examination, after glancing at the mouth, does the physician make a note of "extensive dental caries," when there is not a sign of a tooth cavity, the deposits of tartar being mistaken for decay of the enamel! Again, a deposit of tartar about the necks of the teeth is frequently put down as "pyorrhea alveolaris." To have the latter condition in the majority of cases there must be a flow of pus, and though pyorrhea is usually accompanied by tartar, yet the presence of one is by no means an assurance that the other exists also.

How much should the physician know of the lesions of the teeth? He should at least be able to say in the majority of cases whether the pulp of a tooth is exposed, alive, or dead, and on examination of a mouth have some idea of what can be done to improve it, to say whether this tooth must be extracted or that one can be filled, or this other can have a crown placed upon it. The physician should also have the knowledge enabling him to scientifically relieve the sufferings of patients coming to him in cases of emergency with dental lesions. The doctor will frequently apply oil of cloves or other sedative in the attempt to soothe the "nerve" of a tooth already dead, when the seat of the pain is not in the cavity of the tooth itself, but lies in the infected peridental membrane. The carious process in a tooth, and its consequences, is divided into several stages, each of which presents definite symptoms and requires special treatment.

While disclaiming any knowledge of the teeth and their lesions, many physicians, particularly in surgical dispensaries, injudiciously extract teeth that could have been preserved, just because the patient requests extraction, and will often require no further evidence of the tooth at fault than the patient's indication of which he wants "pulled." Thus mistakes are frequently made, and sometimes the operator will remove one or two sound teeth before hitting upon the right one. The indiscriminate extraction of teeth is particularly injurious in children, in whom the lower first permanent molar is often the first to decay. It is allowed to do so by the child's parents under the impression that it is one of the deciduous set, and will be replaced later by a permanent tooth. This tooth should never be extracted if it can possibly be saved, until the other teeth have erupted, as it is the keystone of the dental arch, and the positions of the other permanent teeth depend to a large extent upon it.

Many pathologic conditions of the face and jaws come to the notice of physicians and surgeons that are dependent upon dental lesions, but the causes of which are not recognized by them. Suppurating sinuses upon the face or neck may be treated for months, by curetting the underlying bone, applying nitrate of silver, and so forth, when the simple extraction of an infected tooth or hidden root would cure the case in a few days.

Many physicians will diagnose a case as trifacial neuralgia or tic douloureux on the symptoms alone, without a search by all the means available for an underlying local cause of the pain. In this way dental lesions, such as impacted teeth, pulp-stones, etc., are often overlooked. Nearly every case of trifacial neuralgia is in the first place due to local irritation, though, in cases of long-standing pain it may persist after removal of the original cause, and it is sometimes hard to discover a local cause. But this should not deter us from using every available means of search, such as the X-ray and other methods, which often point to a local lesion, the removal of which may save the patient from a ganglion operation. It may be laid down as axiomatic that an X-ray examination should be made in every case of pain about the face in which the cause is not immediately obvious.

In fractures of the jaws, the surgeon should be able to say what kind of appliance is suitable for a given case, instead of referring the patient to the dentist with the indefinite request that an interdental splint be made.

ERRORS OF DENTISTS DUE TO LACK OF PATHOLOGICAL TRAINING.

In contrast to the tendency on the part of some physicians to value lightly the preservation of the dental organs, the dentist too frequently attempts to preserve teeth that should be extracted. No attempt should be made to save teeth with abscesses discharging into the maxillary sinus or externally on the face or neck. In exceptional instances a healthy condition is regained without loss of these teeth, but in the great majority they must be sacrificed.

X-ray examinations show with astonishing frequency teeth bearing artificial crowns with abscess cavities at their roots—results of prolonged attempts at preservation of teeth that should have been extracted long before. While it is possible to preserve and render useful many teeth that have caused alveolar abscesses, it is also true that too many of these teeth are retained, and remain as sources of irritation for years.

There is also a hesitancy on the part of dentists about extracting a badly decayed tooth that is causing an alveolar abscess. The patient is told to wait until the abscess subsides, as extraction might cause the inflammation to spread. The patient then consults the family physician, who refuses to interfere and sends him back to the dentist. Through these delays the abscess often does "spread," extending to the bone, setting up osteomyelitis and necrosis. In some cases, of course, the swelling is too great to insure the success of an attempt to extract the tooth, and the pus must first be allowed to escape by an incision in the gum over the swelling, extraction being deferred until the latter has subsided.

Another example of the imperfect understanding of pathology by the dentist is the injection of local anesthetics into the inflamed areas about teeth prior to extraction. This mechanically forces bacteria and their products into surrounding healthy tissues, frequently causing osteomyelitis and necrosis, to say nothing of the toxic local and general action of the drug itself. No matter how carefully the operator may sterilize his needle, spread of the infection already present will occur in many cases. As to general anesthetics, while nitrous oxid may be administered with impunity by the dentist who has little or no knowledge of physical diagnosis, the same cannot be said of ethyl chlorid and its combinations under various proprietary names, such as "Somnoform," etc., which are given indiscriminately every day in the offices of hundreds of dentists. The lack of knowledge of physical diagnosis on the part of the dentist, causing him to overlook cardiac and other lesions, renders also the local use of cocain dangerous in his hands.

SUGGESTIONS FOR IMPROVEMENT.

This brief presentation, it is hoped, will make clear the advantages of a better understanding by physicians of the lesions of the teeth, and a more thorough training on the part of dentists in general pathology and physical diagnosis.

These conditions would be brought about for the physician by a short course in our medical schools on pathologic processes of the teeth and jaws, with their diagnosis and treatment. Such a course would include the pathology, symptoms, and emergency treatment of dental caries, pulpitis, pericementitis, and alveolar abscess; the recognition of various other lesions of the teeth, different forms of stomatitis, impacted teeth, diagnosis of oral conditions responsible for trifacial neuralgia and other local and general disturbances; the special treatment of fractures of the jaws and their complications; and many other conditions that at the present time do not receive sufficient attention in medical schools.

The *ideal* education for the dentist would be the complete medical course leading to the degree of Doctor of Medicine, followed afterward by the special training required in dental operations. This plan would make of dentistry a true specialty of medicine, on a par with laryngology, gynecology, and the other specialties—instead of being, as it is now, an almost independent profession. This is rendered impracticable, as a regular plan, by the large amount of training necessary to the efficient performance of reparative work. But we are told that dentistry stands for more than this, and takes upon its shoulders the treatment of affections of the vital processes in the teeth and jaws. Such being the case, and circumstances making it necessary for dentistry to be regarded as a separate profession, the most practical way of meeting the difficulty is to educate the dentist more broadly in the principles of pathology, medicine, and surgery. The student, in addition to the adequate courses in chemistry, anatomy, physiology, and bacteriology that are already required, should have instruction in general pathology and in physical diagnosis, with a few hours devoted to clinical medicine, and more particularly to surgery. Practical work in a general surgical dispensary would be of the greatest assistance to him and would broaden his view in the diagnosis and treatment of diseases of the teeth and jaws. The great drawback to this plan is that it would permit of less time for practice in the mechanical side of dentistry. This is illustrated in England and on the continent of Europe, where students are educated more along general medical and surgical lines, and where manipulative skill is consequently not so great, as a general thing, as it is among dentists with an American education.

Finally, the treatment of hospital patients suffering from various pathologic conditions of the jaws would be greatly improved by having in all large hospitals graduate dentists as internes. This has been done at the Philadelphia General Hospital for the past eleven years. The dental internes not only have the care of injuries and diseases of the jaws, but also look after the mouth hygiene of all cases in the hospital. This co-operation of physician and dentist is of inestimable value to the patient and to the hospital, and is mutually beneficial in the education of the internes themselves.

THE QUESTION OF EXTRACTION IN ORTHODONTIA.

By CALVIN S. CASE, D.D.S., M.D., Chicago, Ill.

(Read before Section I of the National Dental Association, at its annual meeting, Cleveland, Ohio, July 25, 1911.)

(Continued from page 157.)

(II.)

WITHIN the past few years certain prominent writers have repeatedly emphasized the theory that nature's plan in the physical structure of each individual is an harmonious one; that the form, size, position, and relation of the various parts which go to form the framework of bodies, especially that of the human face, are intended to be in perfect harmony with each other according to the racial type, and that whenever they depart from this, it is always due to some diseased condition which has perverted or interfered with the intended normal development.

I could quote pages of this teaching, which is well stated in the following excerpt: "Let us remember that malocclusion of the teeth is always associated with a lack in the growth of bone, or the perverted growth of bone, in degree corresponding exactly with the degree of malocclusion. Nature attempts to build a denture, a face, a skull, and all other parts of the anatomy to be in accordance throughout with a type she has designed for the individual; but for some reason, some of her processes in the building of the different parts may have been interfered with. The result, as we find it, is perversion or arrest in the growth of the alveolar process, jaws, and associate bones, and malocclusion."

These writers do not admit, and they even go so far as to ridicule by absurd and false examples, the possibility that heredity has had anything to do in the inharmonies which arise in the sizes and malrelations of the teeth and jaws, or any of the other bones of the skull. In fact, they deny that such inharmonies exist in the natural or normal state—in other words, that the union of dissimilar types produces in the offspring inharmonies in the sizes, etc., of bones which are so closely related as the teeth and jaws and associate bones.

It is further asserted as a very strong probability in young people, that whenever the mandible, for instance, is found to be of a size insufficient for perfect facial harmony, before or after orthodontic operations, the stimulating effect of the operation and subsequent normal occlusion will result in an interstitial growth of this and other bones of the head which may be lacking in size; one writer claiming that this possibility of bone-growing through the influence of artificial stimuli is based upon biological law, and therefore will obtain whether the comparative smallness of the bones is of the inherited sizes or not.

All of these theoretical propositions, if true, would tend to prove that no teeth should ever be extracted in the correction of malocclusions; and this, moreover, seems to be the main reason for the repeated efforts on the part of the school that is advocating this principle to foist upon this profession these theories, which as a matter of fact have no scientific basis whatever.

THE LAWS OF HEREDITY AND VARIATION.

I therefore may be excused for dwelling at some length upon the well-established evidences of ethnology, with a glance at the laws upon which the science of biology is founded, though in a paper of this character so great a subject can be treated in no more than a cursory manner.

There is no doubt in the minds of advanced anthropologists that the form, structure, and relation of the bones of the human skull, like those of other bones of the body, were evolved from a being very much lower in the animal scale, through the unwavering laws of heredity, variation, natural selection, and influences of environment. And that the species homo, through segregation in distantly located parts of the globe presenting marked differences of environments, became through slight variations during many ages the different races of peoples, characterized by distinct types in color, hair, and physical framework of physiognomies, etc.

While there are only three markedly distinct races—the white or Caucasian, the yellow or mongoloid, and the black or negroid—through admixtures by intertribal relations and more distant migrations, many quite distinct races have been formed, with the production of intervening types, which are said to blend into each other with imperceptible gradations.

This is a subject which pertains to the established sciences of stomatology and ethnology—branches of anthropology—which are today taught in our colleges, and which are founded upon many years of patient, careful investigations by the most learned scientific minds.

It is shown that the present white race, more than any of the others, is decidedly a mixed race, there being few if any left of the original representatives of the Caucasian type, to which we are accustomed to refer as the standard of beauty and physical perfection. Yet because of the fact that our tastes and appreciation of these qualities are being varied under the same adaptive guiding forces of evolution which have characterized the physical, we not uncommonly meet with types which fully accord with our own understanding of manly beauty and perfection, which I presume was also true of the Hottentots, before their land was visited by a higher race.

What interests us most as orthodontists, especially if we essay the correction or improvement of facial beauty that is marred or deformed by malpositions and malrelations of the teeth and jaws, is the fact that in our own America, above all other localities, the union of dissimilar types occurs most frequently. Furthermore, the laws of heredity, throughout the whole line of biological development in flora or fauna, do not necessarily produce in the offspring a blended composite type. In fact, such an occurrence from parents of dissimilar types is far more rare than otherwise. The offspring from fertilization in dissimilar types of both plants and animals often exhibits an association of distinct physical characters that obtain in both parents or their progenitors, as the forces of atavism may be carried through many generations. A slight observation of physiognomies must fully demonstrate the inheritance of inharmonious characteristics—"For nature knows no laws of esthetics, as beautiful and harmonious as her products are."

This has been fully recognized by both Darwin and Wallace in the earlier researches of evolution. Huxley, more than thirty years ago, in writing upon the laws of heredity and variation, said: "It is a matter of perfectly common experience that the tendency on the part of the offspring always is to reproduce the forms of the parents; that is a matter of ordinary and familiar observation. In all cases of propagation and perpetuation there seems to be a tendency in the offspring to take the characters of the parental organisms. Nor do you find that the male follows the precise type of the male parent, nor does the female always inherit the precise characteristics of the mother—there is always a proportion of the female characters in the male offspring, and of the male characters in the female offspring. There are all sorts of intermixtures, and intermediate conditions between the two of dissimilar types, when complexion, beauty, or fifty other different peculiarities belonging to either side of the house are reproduced in other members of the same family. You will also see a child in a family who is not like either its father or mother, but some old person who knew its grandmother, or it may be an uncle, or perhaps a more distant relative, will see a great similarity between the child and some of these." Much could be written and quoted along this line, but time will not permit.

With a moderate understanding of the ethnological principles of biological development, with our minds free and untrammeled by preconceived ideas and tendencies to follow a leader even into unscientific paths, I should like to speak of the art side of our specialty, which directly relates to the question of extraction.

Notwithstanding the fact that all the recent text-books and papers that have emanated from the new school of orthodontia taboo and even ridicule the claims that heredity is one of the causes of malocclusion, I believe the time is not far distant when a broadened understanding of associate sciences will correct this error, and when all men who are striving for the common good of humanity will work hand in hand as brothers, co-operating in this great field of our specialty, which presents such abundant opportunity for the display of science, art, and mechanics.

The present phase of my subject pertains to that which we find exemplified everywhere about us—first, to the relationship as regards size, form, and position of the maxillary bones proper to the balance of the bones which form the framework of physiognomies; second, to the relations of the dental and the alveolar arches to the true bones of the maxillæ—both with a view of comparing that which we commonly find with that harmony of relation produced by the most perfect facial effect which accords with our present standard of beauty; third, it pertains to the question of abandoning true facial art for set rules of practice along lines drawn mechanically and mathematically which are claimed to be applicable for every case.

I believe it is quite generally conceded that all forms of animal life about us are the offspring of progenitors whose physical and mental characteristics they repeat to a very large extent, either by direct inheritance with the blending of types, or with the association of the distinct characters of one or both parents or, through atavism, of more distant progenitors. The law of variation, about the forces of which little is known, is always and everywhere in action through the metabolic activities of the germ cells, with the production of slight transmissible modifications, though occasionally with unaccountable spontaneous variations.

It will be seen that the types, within each class of species, present the most marked differences in the form and size of the bones which constitute the framework of bodies. Thus we have tall and short men, either one of which may possess strong, heavily built bones or slender and delicate ones; nor does esthetic harmony nor the typically anatomical prevail, except rarely, with each individual. Moreover, it is common to find inharmonies in the sizes and relations of bones which are closely associated, as the bones of the face, and which can frequently be traced to direct inheritance or the admixture of inharmonious types.

In this investigation, which anyone with an observing mind may pursue, there will be found to exist every possible variation between the so-called freaks and those of Apollo-like harmony and perfection. If these types could be collected and placed side by side, they would blend into each other with imperceptible gradations; just as we find noses of every possible shape in relation to harmony with the features upon which they are placed, and jaws prognathous and retruded in relation to the balance of the features. This must be equally true of the sizes of teeth whose width measurements we are told should be employed to determine the sizes of the newly regulated dental arches. If the sizes of dental arches are made in exact mathematical proportion to the width of the upper central incisors, will not these arches be found at times too large or too small for facial harmony, and to an extent that is noticeably deforming? We frequently find the sizes of the front teeth quite out of proportion with the features. Moreover, the width measurements of the right and left centrals are rarely alike, and commonly vary under *normal* conditions 1/64 of an inch, and at times even more.

Many of the facial inharmonies pertain to the dental and maxillary framework, and characterize the physiognomies as plain, homely, or deformed, according to the character and amount of the protrusions or retrusions over the dento-facial and mandibular area, and whose beautifying correction should be one of the highest aims of the dental orthopedist.

In many protrusions, both unimaxillary and bimaxillary, the entire bodies of the maxillæ, or at least the portions which support the alveolar processes, are protruded in their dento-facial relations, which is easily determined by the prominence of the chin and the prominence at the base of the nose and along the upper portion of the upper lip. In many of these cases the teeth are in perfect harmony of size and position with the protruded jaws, in arch width, alignment, and inclination, and yet distinctly out of balance with the esthetic relations of the features. Moreover, in bimaxillary malpositions the teeth are often found, as I have shown, in typical occlusion in the white as well as in colored races, because both dentures are equally protruded. Again, in a large proportion of protrusions, the protrusion pertains mostly or wholly to the dental and alveolar arches alone.

Thus every malposition in dental and dento-facial relations may be found, which points directly to the law of heredity as a cause for many malocclusions of the teeth, and not to the narrow view that God does not make such mistakes in forming the human anatomies of physiognomies, except in "freaks."

A prominent author of a recent work on biology and a member of the faculty of Columbia University, to whom I submitted the biological portion of my paper for criticism, writes me as follows: "I have indicated by notes in the manuscript my impressions of the topics discussed, and feel myself entirely in sympathy with your point of view. A statement like 'Nature never puts teeth into a mouth that do not belong to that physiognomy' always arouses my ire. Variation is so thoroughly the rule in nature, not only in individuals but in *parts* of individuals, that there is just as apt to be disharmony as harmony. Of course, in so far as the race is concerned, inharmonies which render the individual unfit for environment or unattractive as a mate will be weeded out, but the same variations will occur again and again in individuals. I suppose your opponents would hold that bone and teeth, coming from the same elementary tissues, would carry the same inheritance, but observations show this to be untrue. And obviously it is untrue in relation to the bones of the head."

PRACTICAL CONSIDERATIONS.

In two cases presented by me at the anniversary meeting of the First District Dental Society of New York city, in 1907, shown in Figs. 24 and 25 in the preceding section of this paper, the mandible of one was decidedly protruded, with the crowns of the lower denture in normal dento-facial relations, the front teeth being lingually inclined, while in the other case the mandible was in normal dento-facial relations, with the crowns and occlusal ends of the denture decidedly protruded, the front teeth being labially inclined.

Moreover, in nearly all typical protrusions of the dentures not due to local causes the teeth are crowded closely together, showing that the buccal teeth partake of the protruded malposition quite as much as the labial teeth.

This brings us to a point which I wish to emphasize, because it pertains to the question of early correction, and particularly to the teaching of shifting the deciduous buccal teeth and recently erupted first molars to normal, in all cases of disto-mesial malocclusion, even though the buccal cups are in full mal-interdigitation. I wish it to be understood that I am heartily in accord with this movement, at whatever age where it is distinctly seen to be demanded. The cases that demand it are, first, those which arise from local causes and which otherwise would be in normal relations; and second, from whatever cause, if one denture or the other is retruded in its dento-facial relations, and the other is not so protruded but that the slight distal movement possible will ultimately correct the protruded facial outlines.

If it is other than this, or if it is a case which it is very liable to be when one denture is destined to be normal and the opposing denture through heredity is decidedly protruded, the operator can rest assured that treatment of this kind, *at whatever age,* will ultimately result in a bimaxillary protrusion, marring the beauty of the face through adult life; nor am I so sure that it is possible to tell what the real conditions are, at this very early age when the bones are just beginning to take on the inherent stamp of their progenitors.

In the hundreds of cases which have come under my observation during the ages of childhood and youth, there is no room to spare in the jaws, especially in protruded cases, back of the deciduous molars, except at the time preparatory to the eruption of the first molars, and finally the second and then the third molars; the latter being often obliged to occupy quite as crowded positions as are seen when teeth are not protruded. In other words, in all cases of typical protrusion in the white race due to heredity, the natural position of the back teeth in relation to the jaws allows for no more than a very moderate distal movement that does not encroach upon space demanded for the succeeding molars, a demand which nature will at one time or another insist upon, or else make trouble.

Therefore in all threatened inherent protrusions, if the molars are moved distally in early childhood to a degree sufficient to correct the protrusion without extraction—which is not at all probable, even if possible—one may count quite surely upon ultimate disaster. It may be claimed here that, inasmuch as the greatest forward growth of the jaw during these ages occurs back of the deciduous denture, by crowding the molars back nature will be forced to make the jaw grow larger to meet the demand.

In discussing a paper read recently before a prominent society upon the advantages of radiographs in orthodontia, a prominent teacher in a dental college—who evidently had caught the "bone-growing" fever—criticized Dr. Cryer's warning in regard to the excessive distal movement of molars, upon the bare evidence of a single case that was shown, in which a third molar that evidently had been impacted by a distal movement of a second molar had finally erupted to normal position. This speaker also expressed in unmistakable terms his belief that the crowding of the teeth and the artificially applied forces will stimulate the interstitial growth and elongation of the jaw-bone itself, and thus carry all the denture forward and give plenty of room for the third molars. This is abundantly proved to be untrue by the many instances of crowded dentures that are protruded in relation to the jaws in which they are placed; if it were possible for this crowding stress of the teeth to create a greater than the inherent size of a mandible, for instance, one would not so frequently see retruded chins. The single case shown may have been one in which the distal movement was not great, and the mandible destined by heredity to be sufficiently large for all the teeth. Besides, if the speaker who presented these radiographs will make pictures of unerupted third molars which finally come into normal positions, he will find them occasionally in exactly the position shown.

If nature possessed this power in the individual, or if it were possible for us to stimulate nature to an extra-interstitial growth, which the critic and many others seem anxious to proclaim, there would be far more harmonious relation between the sizes of dentures and jaws than is seen to exist. We would not see those frequent, marked cases of bimaxillary protrusions which are not usually noticeable until ten or twelve years of age, and which seem to increase in prominence during adolescence.

In my opinion, the jaw-bones proper—and especially the mandible, which is not subjected to the same influences as retard the development of the upper jaw—assume the forms and sizes determined by the unchangeable laws of heredity under healthy growth conditions in the same way as other bones of the body. While the rapidity of their early growth may be hastened, while inhibited developments may be stimulated to normal growth, and while the forms of the bones may be varied slightly by bending, I doubt if it has ever been authentically proved that natural or artificial forces have made them grow interstitially longer than their inherent normal size.

As I have mentioned elsewhere, what really takes place in the artificial production of normal occlusion in these cases is that the opposing denture is moved forward far more than the protruded denture is moved backward. In the many cases of inherited upper protrusions, for instance, where the lower denture is in normal dento-facial relations, the ultimate unhappy result which is left to stamp itself upon the future physiognomy is a bimaxillary protrusion, with a probable receding-chin effect.

I know what the opposing answer to this contention will be, *i.e.* that there is no such thing as an inherited protrusion of the teeth. To this I will reply, beforehand: Then there is no such thing as prognathous mandibles—which may be seen everywhere! Furthermore, my opponents' statement is a denial of the established evidences of ethnology.

It would be far more advisable, in my opinion, in those cases of marked disto-mesial malocclusion of the buccal teeth which are not distinctly due to local causes or to retrusions of one denture or the other, to wait for a more mature development of the facial outlines, which would enable a sure and correct diagnosis of the conditions, and then treat the case along the lines of art and within the realms of physiologic demands.

"BONE-GROWING."

The theory entitled "bone-growing," which has recently sprung into the limelight and has been so enthusiastically grasped by many who seem to see in it a means for obviating one of the greatest difficulties of correcting malocclusions without extraction, is, in its true and legitimate sense, an old and well-established principle in orthopedic surgery, and which now is given a new name and clothed with added powers based upon no clinical evidence or scientific data.

This theory briefly stated is: The stimulating effects of orthodontic movements of the teeth, and the healthful activities of a normal occlusion will cause the jaws and associate bones to grow to the harmonizing sizes of the dentures. In other words, in those cases of decided upper protrusion, for instance, in which the lower denture and lower lip are in anatomical and esthetic relations to the lower jaw and chin, when corrected without extraction and the lower denture is forced forward considerably farther than the upper is retruded, as is common with ordinary methods—leaving a protruding mouth and a receding chin effect—that if this operation is performed during childhood or youth there will ultimately arise a growth of the bones sufficient to harmonize the facial relations.

As it has been asserted that this possibility is in accord with biological law, it may be well to glance at some of the principles of biological development and methods of artificial cultivation, to see if we can find the semblance of a law that should lead to a belief that the true bones of individuals can be stimulated by mechanical force to grow beyond their inherent sizes, or the sizes which they would naturally assume under favorable conditions.

Biology and biologists deal only with the natural laws of organic evolution. By long patient and scientific investigation, biologists verify every proposition over and over again before it is stated as a scientific truth. These pertain principally to the problems of life, heredity, natural selection, variation, and influences of environment. Moreover, the truth of these laws is further abundantly verified by artificial selection in the cultivation of plant and animal types.

To state briefly: The law of heredity is so strong that everything in life would exactly duplicate itself in form and structure were it not for the unceasing law of natural variation. Furthermore, the forms that are endowed with natural variations would all become extinct under the strong forces of atavistic heredity, so that there would be no science of biology or organic evolution were it not for the law of natural selection induced by differences of environment.

It may be well to state that the law of natural variation, fulfilled in both natural and artificial selection, has no reference in biology to perceptible physical changes in structure that arise or that may be produced in individuals from local causes or from artificial stimuli. Such events have little or nothing to do with biology proper, because that kind of variation is not transmissible, except when the cause and its results obtain through many generations so as to finally become a natural variation.

Moreover, such physical changes of a permanent nature in the individual, other than those which arise in resuming interrupted growth and the development of functional activities, are never of a normal structural character in animal life, and certainly never result in healthy interstitial growth of bones to the extent of carrying their development to a larger than their inherent size or form. I am making this assertion advisedly, basing it on opinions which I have recently obtained from some of the most advanced authors and teachers of biology, and which hardly accord with the opinion stated to me personally by an ardent believer is this recent propaganda of bone-growing. When I said to him: "If this is true, we could make all small men grow taller," he replied, "I presume we could, if we knew how to apply the right kind of mechanical force."

The *natural* variation with which the science of biology deals arises during the metabolic activities of the fertilized germ cells in both plants and animals, of which there are many interesting theories that fill volumes.

Again, Darwin's law of natural selection is not, as is usually supposed, the selection of mates through instincts and qualities of the individual or sexual selection, but it is that which was intelligently stated by Huxley when he invented the term "survival of the fittest"—in other words, nature's selection of those who are capable of thriving and procreating their kind amid the environments presented.

In the struggle of life, the influences of environments are exerted very strongly upon each individual toward the production of adaptive qualities and forms, to render them more fitted. Whole libraries have been written upon this phase of biology alone, but in all these volumes adaptive variations induced to arise in the individual after birth are rarely considered as factors in biological development, and certainly one finds nothing in regard to the possibility of producing adaptive or harmonizing changes in the physical framework of animals after birth by mechanical or any other stimuli, because biologists are engaged with the problems of *natural* reproduction and development. Furthermore, I doubt if such accomplishments are possible after one-third of the period between infancy and adult life has elapsed, or at the age when children naturally fall into the hands of orthodontists, and certainly not at the eruptive age of the third molars —which was enthusiastically proclaimed probable by the teacher whom I have quoted.

Such variations in the individual are seen at times in plants whose roots and limbs reach out after moisture and sunlight, but rarely if ever in animal life, except perhaps in superficial tissues, with no effect upon the framework or skeleton except in instances of inhibition resulting in diminished growth. What does occur, and through the forces of which all the various forms of life and species have sprung, an offspring appears, among the many, with a *natural* variation, perhaps induced in fertility by the stimulation of needs which surround the parents, resulting usually in slight changes in form or structure, and yet sufficient to make life easier and more vigorous, and capable of reproduction, and so on, with increased or other adaptive variations *always inherent in the offspring*—the higher adaptive qualities crowding out the weaker.

The framework of the neck of the animal which started to become a giraffe did not grow by increasing the individual lengths of its seven cervical vertebræ under the stimulating strain of need to reach higher for its food. What did occur? A favorable variation arose in this particular in some offspring, which rendered it better fitted to the environment, etc., until, through many generations of reproductions of favorable variations, the present giraffe resulted. Thus it has been with everything everywhere throughout the past ages in the developmental processes toward surrounding us with untold variety of living things. When one begins to comprehend the wonderful co-ordination and interdependence of the forces of heredity, variation, natural selection, and environment, a far deeper veneration and love arises within him for the great Prime Mover of all things.

Man steps in with his artificial selective facilities and hastens the operation —that is all. He does not change or add to it one single biological law. He first selects large quantities of the species he desires to breed, and then, by crossmating or hybridizing, through segregation, foods, and environments, with special scientific methods, he observes in the reproduction of their offspring the mixed, blended, or distinctive types. From these he again selects and segregates the desired types, and again and again breeds, until the special types are fixed. From these forces have arisen nearly all the domestic varieties of flowers, fruits, pigeons, animal strains, etc., which beautify and add pleasure and profit to our lives.

CONCLUSIONS.

I have gone into this subject at considerable length, in order to show the presumption of any man or set of teachers who are not biologists in the true sense proclaiming new theories and laws relative to nature's secret laboratories of organic evolution, without basing them upon any scientific verification in clinical experience or original investigation—theories that are thought out over night and boldly stated in the morning, because they would be fine if they were true, and would help to establish other theories that would be fine if true. The said theory postulates that bone may be formed in the individual in response to mechanical stimuli that are in no essential way different from forces exerted by regulating appliances. This statement does not apply alone to the alveolar process, whose inherent function is to follow and surround the teeth wherever they move or are moved, nor is it confined to the stimulation of undeveloped bone. It refers to true bone—the mandible, if you please, which even if destined to be smaller in the unwavering stamp of heredity than the esthetic requirements of the protruding teeth—which these operators cannot help but deformingly protrude in their efforts to place them in normal occlusion—then nature, by some occult forces undiscovered by biologists, will cause the mandible to grow larger, and also all the other bones of the skull that are not in harmonizing relations to these artificially protruded teeth.

It is freely admitted and frequently verified that bones whose natural development has been inhibited by disease may be stimulated to a revivification of normal growth; also that the physiologic development of true bones may be quickened by artificial stimuli to a more rapid growth toward the normal adult sizes, but I doubt if it will ever be possible to cause the true bones of an individual to grow larger or longer than the sizes which are stamped upon them by the laws of heredity, however strong our desires may be for bone-growing to help us out of our difficulties. I believe I am fully sustained in this view not only by biological processes but by ethnological evidences, which are abundantly confirmed by the conditions prevailing everywhere about us.

Furthermore, I wish to repeat that this whole question of so-called bone-growing, when confined within its true legitimate realm, is nothing more nor less than the stimulation of dormant or inhibited physiologic activities, pertaining to renewed growth and development of bones, a principle which has long been recognized as one of the common possibilities of orthopedic surgery. The propagandists are giving this principle a differently sounding name, and are speeding it on its way under a new and florid phraseology, claiming that it is in accordance with the laws of evolution, and is one of the laws of biology, whereas it has nothing more to do with the principles of evolution and the laws of biology, as I have endeavored to show, than any of the other well-known physiologic principles of growth. When these propagandists attempt to go beyond these principles they are entering an unknown field of biology, where modesty should be the watchword until their theories have been abundantly proved by reliable data.

THE NECESSITY FOR AND TRAINING OF A PROPHYLACTIC ASSISTANT.

By **ALFRED C. FONES, D.D.S.**, Bridgeport, Conn.

(Read before Section III of the National Dental Association, at its annual meeting, Cleveland, Ohio, July 25, 1911.)

HERE is the proposition: After a patient's mouth has been restored to a sound, sanitary condition, what system of treatment in the office can the dentist offer to that patient in order to maintain such a condition in his mouth, year in and year out, at a reasonable expense, to prevent future dental diseases? In other words, has the dentist any system for the prevention of dental diseases? If not, what is the reason?

DENTISTS' AND PATIENTS' DISREGARD OF ORAL HYGIENE.

Surely we know that dental caries can be almost entirely prevented by following a system of extreme cleanliness; we also know that Riggs' disease can be prevented as well as controlled, after surgical treatment, by following a system of cleanliness and gum-brushing. Is the reason for this failure to practice preventive treatment due to a lack of understanding or to inability to cope therewith unaided? The conventional dental practice of today is one that treats only with disease. Almost the entire attention of the practitioner is given to restoration of lost tooth structure; to put it plainly, we are a large band of scientific and artistic repair men. What a hopeless and uninteresting task to spend a lifetime following an endless chain of dental caries and not lift a finger to stop it! The patient, dismissed from the chair today and pronounced sound, will no doubt, if no preventive treatment or instruction is given to him, return in a year's time, when from three to six new operations will have to be performed on his teeth. In this very city of Cleveland, I believe it would be safe to say that there are two million cavities in the teeth of its half-million inhabitants. Less than ten millions of people out of the ninety-two millions in the United States pay any attention to their teeth, except to have them extracted when they ache; yet examinations of the mouths of school children show that from seventy to ninety-seven per cent. are affected with dental caries. In fact, decayed teeth are accepted by the average individual as being normal, and a necessary evil of life. It seems superfluous to reiterate all the reasons why the mouth should be kept in a clean, sanitary condition, but the majority of dentists seem to be indifferent to preventive treatment. The average practitioner cleans the surfaces of his patient's teeth as the last procedure after he has finished his operation, this cleansing process usually requiring from fifteen to twenty minutes, and being performed chiefly for esthetic reasons, not with an understanding of its necessity for the health of the teeth, mouth, and body.

The mouths of the patients of the average practitioner are unclean, unwholesome, and in many cases repulsive. In appearance the teeth are without luster, the gold fillings tarnished, old amalgam fillings rough, and with a piece of a floss silk usually a shelf or shoulder can be detected protruding beyond the cervix of the tooth on the approximal surfaces. The gums are red and slightly congested at the borders. Calcic deposits can be found around the necks of all the teeth; in fact, the mouth shows conclusively that the new patient's dentist has been confining his entire efforts to filling the teeth, and has not appreciated the importance of treating their surfaces for the prevention of dental troubles, or realized the value of proper instruction of his patients in regard to home treatment by brushing, flossing, and using lime-water. Such a dentist will assure his patients that Riggs' disease is incurable. He is focusing his eyes only on the crowns of the teeth, and is quite oblivious to the fact that the foundation of a tooth is the root, and that the life and usefulness of its crown is dependent entirely on the freedom from infection, irritation, or congestion of the tissues composing or surrounding the root.

Before it is possible to make any great progress with the public appreciation of oral hygiene, the dentist must appreciate and practice prophylaxis himself, for each practitioner will then become an educational center, and can readily spread the teachings of prophylaxis to several hundreds of his patients.

FACTS AND RULES REGARDING ORAL HYGIENE.

Let us assume that the following facts are generally known:

(1) That ordinarily, clean teeth will not decay.

(2) That calcic deposits around the necks of the teeth irritate the gingivæ.

(3) That food débris decomposing around the necks of the teeth produces irritants and poisons which, in adult life, will kill the pericementum at its border, causing an absorption of the alveolus and the formation of a pocket.

(4) That rough and improperly finished fillings act as a foothold for food débris, rendering it impossible for the patient to cleanse his teeth properly.

(5) That red and bleeding gums usually show gingival irritation, and that the irritant must be removed. They also show a sluggish blood circulation through the capillaries, which can usually be corrected by proper gum-brushing.

(6) That it is impossible to sterilize the human mouth. Micro-organisms are harmless, unless they have a pabulum upon which to thrive, multiply, and become virulent and aggressive. Food débris is harmless unless acted upon by germ life. If we cannot get rid of the germs, we can surely get rid of food débris, and this is the principle upon which prophylaxis is based.

(7) That contact points are absolutely essential for fillings and for the health of interproximal gum surfaces.

(8) That an unclean mouth acts as an infecting agent for each mouthful of food taken into the body. No matter how clean and wholesome the food may be, it is infected by millions of active micro-organisms the moment the teeth close on it, and the individual eventually is apt to suffer from the products of bacterial digestion in the stomach and intestines, instead of profiting from natural digestion.

(9) That an unclean mouth not only produces many systemic disturbances of a very serious nature, but in childhood, if it contains decayed teeth which render mastication of food painful and create a habit of bolting the food, it constitutes a powerful factor in swerving a career from one of usefulness and advancement to one of retrogression, misery, and crime.

(10) In periods ranging from four to eight weeks, over the surfaces of the teeth in the average mouth, a transparent film is formed which defies removal by the tooth-brush. Around the necks of the teeth and under the gingivæ fine calcic deposits and a glue-like substance composed of mucous and food débris accumulates, which the brush cannot reach and the floss silk does not remove. The patient is unable to keep these surfaces clean and polished without our aid. To obtain the best results frequent prophylactic treatments are a necessity.

PROPHYLACTIC PRACTICE.

Many other reasons could be given why the mouth should be kept in a clean, wholesome state, but the main reason, the one which most interests our patients, is that eighty per cent. of all dental operations can be prevented by teaching and practicing prophylaxis. This does not mean that we will not have to operate every day of our practice, but that we will eventually be able to take care of a great number of people and keep their mouths in a state of perfcet health, with a minimum amount of nerve strain both for our patients and ourselves.

Our practice will gradually change from one of disease to one of health. Alveolar abscesses will be rare; exposed pulps will be infrequent, and only as we take new patients into our practice shall we be obliged to contend with the painful side of dentistry.

WOMAN BEST SUITED FOR PROPHYLACTIC ASSISTANT.

If this idea of establishing a system of preventive treatment in his practice appeals to a dentist as it should, the question will now arise, How can it be done? A busy practitioner cannot comfortably do this work alone, unless he limits the number of his patients to comparatively few. He must have aid, and I believe the ideal assistant for this work to be a woman. A man is not content to limit himself to this one specialty, while a woman is willing to confine her energy and skill to this one form of treatment. A woman is apt to be conscientious and painstaking in her work. She is honest and reliable, and in this one form of practice, I think, she is better fitted for the position of prophylactic assistant than is a man.

In order to systematize this work and render it really effective, also to lessen the expense to the patient, we must have such an assistant. It is a mistake to imagine that inaugurating such a system of preventive treatment in one's own practice involves an extra burden. The most difficult task lies in the training of the assistant, and in converting the patients. If I were to start anew in this work, I would issue a carefully prepared statement to my patients, explaining prophylaxis and what I believed it would do for the prevention of dental diseases, and invite them to try this system for a year. This would save much preliminary talking on the dentist's part, and invite intelligent questioning from the patients. After thorough demonstration and instruction in brushing and flossing as home treatment, and after having undergone at regular intervals instrumentation and polishing as office treatment, I believe that at the end of the year the patients would require no urging to continue this system.

TRAINING OF A PROPHYLACTIC ASSISTANT.

We must realize that at the present time there is no school for the training of women in this specialty. The small number of dentists who have prophylactic assistants were either obliged to train them or to secure dental graduates who had some knowledge of the work. This is the pioneer period, and until the demand becomes so great that our dental colleges will feel obliged to establish a special course for the training of such assistants, we must educate these women ourselves in our own offices.

Three possibilities as to source present themselves in the securing of an assistant: First, a woman who has served as assistant to a dentist, and who is already acquainted with his patients; second, a trained medical nurse; third, the possibility of soon establishing prophylactic treatments in our public schools for the prevention of dental caries, and the consequent training of young women for this work. These school clinics would become a school for prophylactic assistants, from which the profession could be supplied.

TRAINING A TIRO FOR PROPHYLACTIC WORK.

Let us consider the first one, and I will explain in some detail how I trained my assistant. She was first given drawings and books from which to study the anatomy of the teeth and their surrounding tissues. Next, natural teeth were secured from a dentist who makes a specialty of extracting, and these were arranged in warm modeling compound in the positions which they normally occupy in the mandible. The surfaces were smeared with ink, and she was then instructed to remove every trace of ink from the teeth with an orange-wood stick and wet pumice. This first operation took nearly all day. The teeth were again covered with ink, which was then removed in a shorter space of time. Again and again this operation was repeated, until her muscles became trained in manipulating the stick, and at the end of two weeks she could clean the set of teeth in one hour's time. At the lunch hour she sat in my chair, holding a hand mirror, and watched me as I went over her teeth with stick and pumice, and while polishing showed her the thumb rests for the hand to secure pressure and prevent slipping. At last I became the victim, and with the hand mirror watched and instructed her while she worked in my mouth. After a month's training I felt that she was competent to polish the teeth of children. This she did for quite a while, and in the meantime I instructed her in the use of a few instruments. She watched me while I operated on patients. Again she became the patient, watching me with the hand mirror, and in turn I became the patient. In the first half-dozen lessons with the instruments, the chief instructions consisted in what not to do. During the first six months of her practice, only the heavy deposits of tartar were removed by her, but I found that by doing this preliminary work only she was saving me a great amount of time. Gradually her technique and sense of touch improved, and today, after she has practiced for seven years, I can find no fault with the results we are obtaining.

TRAINING A MEDICAL NURSE FOR PROPHYLACTIC WORK.

In training a medical nurse for this work, I would pursue a similar course. I think there would be some advantage in having a trained medical nurse. Her course of lectures and training at the hospital would be of advantage to her, and the confidence of the public in the work and service of these women is already established. I believe there would be no difficulty in securing trained nurses at a reasonable price, to start with, to do this prophylactic work. Trained nurses receive on an average twenty-five dollars a week; but their time is not always engaged, so that, in the course of a year, they might not average over fifteen dollars a week. The hours of a dental practice would be more attractive to most of these women than the continuous hours of nursing, and in my opinion it would not be difficult to secure their services for this prophylactic work.

TRAINING PROPHYLACTIC ASSISTANTS IN PUBLIC DENTAL CLINICS.

If, however, we, as a profession, are to stay the flood of dental decay, prophylactic treatment must be established in our public schools. I believe that women during the first year would give their services almost free for such work, since the training which they would receive would fit them for the desirable positions as assistants in dental offices.

If we could have dental clinics conducted along the following lines, our ideas regarding a school for prophylactic assistants would be realized.

Suppose it were possible to secure a room in one of our large school buildings and equip it with fifteen dental chairs, brackets, compressed air, washbowls, sterilizers, etc. Beside these chairs stand fifteen women in white costumes. Two are dental graduates and are paid a salary, and their duties consist of relieving poor school children of toothache, and doing what they can in operative work with cements, alloys, and gutta-percha. The other thirteen women are being trained as assistants, and are giving prophylactic treatments to the retarded children and those most needy of such service.

Instructions are given in brushing, brushes are supplied to those unable to buy them, records are kept in order to keep in touch with each child under treatment; in short, everything possible is done to prevent dental caries and promote oral hygiene. Local dental societies could appoint members to lecture to these women. Possibly arrangements could be made at the hospitals for their attending some of the lectures for nurses, or in cities where there are dental colleges they might be permitted to attend those lectures which would be most helpful in their specialty. High-school graduates give their services almost free for the first two years at the training school to become teachers. The salary which they could command as prophylactic assistants in dental offices would be a considerably higher one, especially after a few years' experience, than they could hope to receive as teachers. Under such conditions I believe it would be possible to secure intelligent women in our school clinics at a very small salary, for the first year at least. In this way a double service to the public could be established. The school children would be greatly benefited by treatments and lessons in oral hygiene, and the dental profession would have a source of supply of prophylactic assistants. In Connecticut a provision is made in the dental law permitting the employment and practice of such assistants. I believe that eventually all states must provide for this much-needed practice.

Some may think that these assistants should be dental graduates. This I believe is unnecessary, for in either case it is chiefly a question of the development of a delicate touch and the training of special muscles, both of which require time and practice to accomplish. It is doubtful if the woman graduate would be content to confine herself to prophylaxis alone. I believe that the dentist should have each patient come under his observation at regular intervals, possibly once in six months, for a thorough examination of the mouth and a thorough prophylactic treatment. If he does not give these treatments himself, how can he know that his assistant is thorough in her work? Personally, I consider prophylaxis as being first, and operative work as secondary in importance in my practice. If the dentist does not perform these treatments himself periodically, I believe he will become the assistant, and the patients will consult the prophylactic operator as to the condition of their mouths. He will merely be called upon when there is repair work to be done.

In closing, I wish to say that the dentist who is not experiencing the pleasure of having every patient in his chair present a clean, sanitary mouth, with pink gums and polished teeth, is really missing the ideal in dentistry.

AN EXPERIMENTAL STUDY OF THE TOOTH-STAINING PROPERTIES OF VARIOUS COLORED DENTIFRICES.

(A Research conducted in the Laboratories and Clinics of the Ohio College of Dental Surgery.)

By **W. H. O. MCGEHEE, M.D., D.D.S.,** Cincinnati, Ohio.

(Read before Section III of the National Dental Association, at its annual meeting, Cleveland, Ohio, July 27, 1911.)

IN a paper entitled "Rationalism *vs.* Empiricism in the Selection of Dental Remedies," read by me before the Cincinnati Odontological Society, December 30, 1910, and published in the *Dental Brief* for May 1911, I mentioned the well-known fact that discoloration of tooth structure may be produced by the use of such agents as silver nitrate, the essential oils, iodin, potassium permanganate, and other drugs. I also at that time made the significant statement that *Colored mouth-washes or tooth preparations of any kind constantly used on exposed dentinal surfaces will be absorbed into the dentinal tubules and produce staining, consequently they should be discarded in favor of colorless preparations.*

DISCOLORATION OF TOOTH STRUCTURE BY VARIOUS DRUGS.

The idea that discoloration of tooth structure is produced in the mouth by the constant use of colored dentifrices is one which has lain more or less dormant in my mind for some years, and I cannot remember when it originated. I had heard, at intervals, complaints on the part of patients that certain dentifrices caused their teeth to turn dark, but paid no particular attention to them at the time they were made. The statement, however, of this idea in the paper, as just mentioned, was made after some thought and with a firm conviction that it was true, although I had at that time collected very little evidence of its veracity. Several months ago the importance of the subject and the persistence of the thought took such a firm hold upon me that I decided to begin an investigation of the entire subject of discoloration of tooth structure by drugs and proprietary preparations in general.

I immediately began a search of medical and dental literature for all the evidence I could bring to bear on the subject, and was surprised to find how little has been written and how meager is our knowledge, in regard to discoloration, of the action of the various drugs and formulæ which we are using in the mouth.

Every dentist is familiar with the brief statements made by various writers in text-books and journals, that oil of cassia will stain tooth structure, and that mercuric chlorid, iodin, iron salts, potassium permanganate, silver nitrate and other drugs will produce discoloration when brought in contact with dentinal matter. Buckley(¹) has brought to our attention the fact that hydrogen dioxid, when brought in contact with blood in a root-canal, has a tendency to discolor the dentin through the formation of ferric oxid, and the same author(²) makes the statement that the use of dialyzed iron and tannin in combination will produce discoloration under similar conditions owing to the formation of iron tannate. Burchard(¹) divides stains of the enamel and dentin as follows:

(1) *Metallic stains*—due to copper, iron, manganese, mercury, lead, nickel, silver, gold (chlorid).

(2) *Non-metallic stains*—such as green stain, black stain (tea, coffee, and iron sulfid during putrefactive decomposition), tobacco stain, red stain (chromogenic bacteria).

Kirk(¹) and Buckley(³) have elucidated most of the phases of discoloration of tooth structure from putrefactive decomposition of the pulp. Kirk(²) has offered a plausible explanation of the causes producing the so-called "pink teeth." The Dental Cosmos(¹) describes under the name of "Chiaie teeth" cases of brown or black discoloration of the enamel of teeth to be found in certain parts of Italy, due to causes not well understood. S. D. Boak(¹) and others have described the red stains produced in the mouths of the Filipinos, Moros, and other oriental peoples by the chewing of the betel-nut. Prentiss in Dental Cosmos(²) calls attention to a brownish discoloration which he terms "saprogenous disintegration," the cause of which is in doubt.

SCOPE OF EXPERIMENTS.

The above brief *résumé*, although many authors who have contributed to this subject have not been mentioned, almost covers our present knowledge of the question of discoloration, the subject of discoloration by drugs and pigmentary matters in dentifrices and other mouth preparations having been almost entirely neglected by writers and investigators.

The experiments recorded in this paper were begun, together with others made with many colored drugs that are used in the mouth, only a few months ago; but, owing to the limited time at my disposal, I have been forced temporarily to abandon all of them except those immediately bearing on the subject of this paper. They offer an attractive as well as extensive work for laborers in the field of research, and I expect to continue my observations when time permits.

The work accomplished on the dentifrice phase of the discoloration problem is by no means complete, although it has involved an immense sacrifice of time and labor. It could not have been continued without the assistance of friends and students, to whom I desire to acknowledge my thanks. I have figured that approximately 1500 hours have been spent by myself and assistants on this work.

CLASSIFICATION OF DENTIFRICES.

For purposes of study, dentifrices may be classified as powders, pastes, soaps, and washes. These may be divided into those which are colorless, or practically so, and those which are colored. Of the colored preparations, the majority are given a distinctive color by the addition of some coloring agent or dye, while others have the color resulting from the mixture of their constituents. Where an artificial coloring matter or dye is used, as a rule it has no particular medicinal value, but is simply incorporated in the mixture to improve its appearance and promote its sale.

CLASSIFICATION OF COLORING MATTERS.

Coloring matters or dye-stuffs are obtained from the vegetable, animal, and mineral kingdoms. Many which were formerly used are rapidly becoming obsolete, while others have been practically abandoned since the advent of the immense list of synthetic preparations recently introduced for this purpose.

The following classification of coloring matters is taken from Arthur G. Green's edition of Schultz and Julius' work entitled "A Systematic Survey of the Organic Coloring Matters."(¹)

Group 1. Nitro coloring matters.
" 2. Monoazo coloring matters.
" 3. Disazo coloring matters.
" 4. Trisazo coloring matters.
" 5. Tetrakisazo coloring matters.
" 6. Nitroso or quinone-oxime coloring matters.
" 7. Stilbene coloring matters.
" 8. Oxyketone, oxylactone, and oxyquinone colors (excluding anthracene derivatives).
" 9. Diphenylmethane coloring matters.
" 10. Triphenylmethane coloring matters.
" 11. Xanthene coloring matters (pyronins, phthaleins, eosins, and rhodamins).
" 12. Acridin coloring matters.
" 13. Anthracene coloring matters.
" 14. Indophenols, indamins, and allied compounds.
" 15. Azins and azonium coloring matters (eurodins, safranins, indulins, and rosindulins).
" 16. Oxazin coloring matters.

Group 17. Thiazin coloring matters.
" 18. Thiazol or thiobenzenyl coloring matters.
" 19. Quinolin coloring matters.
" 20. Sulfid coloring matters.
" 21. Indigo and derivatives.
" 22. Natural coloring matters (derivatives of pyrone, xanthone, isoquinolin, and others of unknown constitution).

Under this classification are described 711 various coloring matters used in the industries, arts, and sciences. Some which were formerly used are now almost obsolete and are not included in that list. I shall mention a number which are omitted, but which are being recommended for coloring dentifrices by various authorities. As will be readily recognized, the great majority of the above groups are coal-tar derivatives, while a number in the last two groups are now also being made artificially or synthetically.

COLORING AGENTS.

Following is a table giving the name, synonym, source, shade, and as far as possible the percentage of employment of a majority of the various coloring agents used in dentifrices. Some of these are being employed in the many proprietary preparations on the market today, while others are recommended by various authorities in formulæ culled from many sources. In accumulating the names and the percentage of employment of these preparations between four and five hundred American, English, German, and French formulæ have been examined:

1. Cochineal (*syn.*, carmine, cochinille, carmine lake). *Dyeing principle*, Carminic acid. *Source*, Dried bodies of the female cochineal insect—Coccus cacti of Mexico and Central America. *Color*, Red, deepened by addition of alkalis. *Percentage of employment*, ¼ to 6.
2. Cudbear (*syn.*, archil, orchil, orseille). *D. prin.*, Orcein. *Source*, Various species of lichen belonging to the families of Roccella and Decanora. *Color*, Reddish brown. *P. c. of empl.*, 1 to 6.
3. Alkanet. *D. prin.*, Alkanin. *Source*, Root of Alkanna tinctoria or Anchusa tinctoria. *Color*, Violet red. *P. c. of empl.*, ¼ to ½.
4. Hematoxylon (*syn.*, logwood, Campechy wood, Blauholz, hematin paste and powder). *D. prin.*, Hematoxylin and hematein. *Source*, Wood of Hæmatoxylon campechianum, of Central America, Cuba, Hayti, etc. *Color*, In alkalis, purple to violet; in water, yellowish brown. *P. c. of empl.*, ¼ to ½.
5. Red Saunders (*syn.*, red santalwood, red sandalwood, santalum rubrum, barwood, camwood). *D. prin.*, Santaline or santalic acid. *Source*, Wood of Pterocarpus santilinus of Africa, East Indies, Ceylon, etc. *Color*, Brownish red. *P. c. of empl.*, 1/10 to 3.
6. Saffron. *Source*, Dried stigma and style of Crocus sativus. *Color*, Golden yellow. *P. c. of empl.*, ¼ to ½.
7. Caramel (*syn.*, burnt sugar. *Color*, Brown. *P. c. of empl.*, ¼ to ½.
8. Chlorophyl (*syn.*, leaf-green, chromule). *D. prin.*, Phyllocyanin and phylloxanthin. *Source*, Grass and leaves of plants and trees. *Color*, Green. *P. c. of empl.*, ¼ to ½.
9. Anilin Red (*syn.*, roseanilin, rosein, fuchsin, magenta). *Source*, Coal-tar derivative. *Color*, Red. *P. c. of empl.*, 1/6 to ½.
10. Anilin Blue (*syn.*, opal blue, gentian blue, Hessian blue, spirit blue). *Source*, Coal-tar derivative. *Color*, Blue. *P. c. of empl.*, 1/6 to ½.
11. Methyl Violet (*syn.*, benzyl violet, Paris violet). *Source*, Coal-tar derivative. *Color*, Violet. *P. c. of empl.*, 1/6 to ½.
12. Erythrosin (*syn.*, eosin J, pyrosin B). *Source*, Coal-tar derivative. *Color*, Cherry red. *P. c. of empl.*, 1/6 to ½.
13. Congo Red. *Source*, Coal-tar derivative. *Color*, Reddish brown. *P. c. of empl.*, ¼ to 1.
14. Prussian Blue (*syn.*, Turnbull's blue, Saxon blue, Paris blue, Chinese blue). *Source*, Iron ferrocyanid. *Color*, Blue. *P. c. of empl.*, ¼ to ½.
15. Catechu (*syn.*, catechu, gambier, cutch). *D. prin.*, Catechin and catechu-tannic acid. *Source*, Dried sap of various species of Acacia or Mimosa, from the East Indies; also from betel-nut. *Color*, Brownish yellow. *P. c. of empl.*, 2 to 10.
16. Indigo. *Source*, Leaves of Indigoferra tinctoria, growing in Bengal, Java, etc. Also made synthetically. *Color*, Blue. *P. c. of empl.*, 1 to 2.
17. Vermilion (*syn.*, cinnabar, red sulfid of mercury. *Color*, Red. *P. c. of empl.*, ½ to 1.

18. **Brazil Wood** (*syn.*, redwood, peachwood, sapan-wood. *D. prin.*, Brazilin and brazilein. *Source*, Wood of several species of Cæsalpinia, of Central and South America, Asia, Africa, etc. *Color*, Red. *P. c. of empl.*, ½ to 2.
19. **Azo Orange R.** *Source*, Coal-tar derivative. *Color*, Brownish yellow. *P. c. of empl.*, 1/6 to ½.
20. **Alizarin.** *Source*, Coal-tar derivative, three varieties—Alizarine V 1, Alizarine R G, Alizarine S X. *Color*, Brownish yellow. *P. c. of empl.*, 1/6 to ½.

In addition to the above, such agents as madder, Venetian red, Florentine lake, smalt, red coral, tincture of hempseed, and amber are mentioned by various authorities.

PROPRIETARY COLORED DENTIFRICES.

The following is a partial list of the most prominent proprietary colored dentifrices on the American market, together with the coloring agent used, as far as I have been able to ascertain it. Many other colored preparations with a local reputation are being put on the market by various retail dealers in every section of the country. Letters were addressed to the manufacturers of the preparations mentioned below, asking the name of the coloring agent. Seven failed to reply, nine either refused to give the information or answered ambiguously, while eight replied as indicated below. To the latter I wish to express my thanks.

1. "Glycothymolin" (wash). (Violet red.) Dye-stuff employed—No definite answer. (Tincture of cudbear.)
2. "Carbolic Mouth-wash" (Meade & Baker's). (Reddish brown.) Dye—None; color due to constituents.
3. "Rubyfoam" (wash). (Red.) Dye—Refused to answer. (Probably cudbear.)
4. "Sozodont" (wash). (Yellowish red.) Dye—Refused to answer. (Probably red saunders.)
5. "Phénol Sodique" (wash). (Dark brown.) Dye—None; color due to constituents.
6. "Colgate's Liquid Dentifrice." (Red.) Dye—No definite answer. (Standard commercial color No. 1.)
7. "Oriental Tooth Paste." (Garnet.) Dye—Cochineal.
8. "Mennen's Liquid Dentifrice." (Red.) Dye—Refused to answer.
9. "Woodbury's Dental Cream." (Pink.) Dye—Cochineal.
10. "Lavoris" (wash). (Red.) Dye—No definite answer. No coloring agent mentioned in published formula.
11. "Euthymol Tooth Paste." (Pink.) Dye—Erythrosin.
12. "Lister's Tooth Soap." (Light red.) Dye—Congo red.
13. "Fragrant Dentifrice" (powder). (Pink.) Dye—Cochineal.
14. "Pasteurine Tooth Paste." (Pink.) Dye—Refused to answer. (Probably erythrosin.)
15. "Oraline Tooth Paste." (Pink.) Dye—No reply.
16. Pâte Dentifrice." (Bright red.) Dye—Reply, "Artificial rose."
17. "Arnica Tooth Soap." (Brownish red.) Dye—No reply.
18. "Beauty Tooth Soap." (Light red.) Dye—No reply.
19. "Banzai" (powder). (Pink.) Dye—No reply.
20. "Perfectine" (wash). (Red.) Dye—No reply.
21. "Peroxident" (wash). (Brownish red.) Dye—No reply.
22. "Thycalol" (wash). (Red.) Dye—No reply.
23. "Rexall Tooth-wash." (Deep red.) Dye—Refused to answer.
24. "Saturol." (Violet red.) Dye—None; color due to constituents.

LABORATORY EXPERIMENTS.

(1) *Experiments with Coloring Agents.*

Laboratory experiments were begun with fifteen agents which are either coloring agents *per se* or were thought to have a tendency to produce staining of tooth structure. At the same time a laboratory investigation of the twenty-four colored dentifrices mentioned above was instituted.

Freshly extracted teeth were used in all the laboratory experiments. These teeth were first thoroughly scaled, then scrubbed with soap and water, and polished with pumice on a clean brush-wheel. A longitudinal section was then made with a saw, preserving each half, one for a control and the other for the experiment. The work has required sections of hundreds of teeth, which were prepared with difficulty, owing to the resistance of the enamel to the saw. The sections were then thoroughly bleached in hydrogen dioxid, and after this, to prevent any possible effects of the dioxid on the preparation to be experimented with, were washed in running filtered water for forty-eight hours.

The tooth-powders, pastes, and soaps were experimented with in saturated watery solutions, this being nearly the percentage in which they are used in the mouth. The water used for experimentation with these dentifrices was ordinary Cincinnati drinking water, as obtained directly from the hydrant.

The experiments with all of the preparations, including the coloring agents, mouth-washes, powders, pastes, and soaps, were begun by placing one-half of the tooth specimen in a test tube containing the preparation, the other half being numbered to correspond, and kept in an envelope for daily comparison with its counterpart.

Agents and solutions employed. For the mouth-wash experiments, watery solutions (filtered hydrant water) of 50, 25, 10, and 5 per cent. strength were made of each preparation to be experimented with. These, as well as the full-strength solution, were placed in test tubes, and the plan already described with reference to the tooth sections was followed.

For the experiments with the coloring matters, solutions either watery or alcoholic, depending on the solubility of the agent, were used of 100, 50, 25, 10, 5, 2½, 1, ½ and 1/10 per cent. strength. The water used in making solutions for the coloring agents was distilled water. Cudbear, alkanet, saffron, chlorophyl, krameria, and wild indigo were obtained from reputable drug supply houses in the form of tinctures or fluid extracts, and alcoholic solutions of these were made. Alkaline solution of carmine was utilized for the experiments with this agent, the weaker solutions being made with distilled water.

Both alcoholic and alkaline watery solutions were experimented with in using hematoxylon. For the watery solution a decoction of hematoxylon was first made, and then colored by the addition of ammonia water. The directions prescribed by the U. S. Pharmacopeia for making decoctions were followed. For the alcoholic solution of this agent a tincture was first made by maceration of the wood and straining through a percolator, according to the usual proceedings prescribed by the U. S. P. for making tinctures.

A tincture was prepared of red saunders after similar methods, and alcoholic solutions were prepared from this. Experiments were also carried on with a decoction which I prepared of this agent, but it was found that the red saunders did not impart its red color to water as it does to alcohol.

Burnt sugar was obtained from a reputable drug house, and watery solutions of various strengths were prepared. A saturated watery solution of chinosol was made and was then filtered for the experiments with this agent, solutions of various strengths being prepared from that. The same plan was followed with roseanilin and methyl violet.

I was unable to make a satisfactory solution of indigo suitable for these experiments. It was utilized as follows: An ordinary emulsion in water was made by adding as much indigo to the water as it would temporarily hold in suspension. This was considered full strength or 100 per cent., and the weaker solutions were prepared from that, the mixture being frequently shaken to prevent settling of the contained indigo. When the teeth were placed in these solutions, the test-tubes were shaken three or four times a day by myself or some of my assistants to stir up the contents.

Tannic acid was experimented with in the form of an emulsion in glycerin, adding as much tannin as the glycerin would hold, by means of a mortar and pestle, and using that for the full-strength experiments, carrying it on to the weaker solutions in glycerin.

The method of making the various percentage solutions used in the experiments with the coloring agents was as follows: Stock solutions were first prepared in full strength, as well as in 50 and 25 per cent. strengths. Then, for making the weaker solutions, either the 50 or the 25 per cent. solution was utilized, carrying this on down to 10 per cent., of which last enough was made not only to be utilized for the experimentation with it, but to have a balance left from which to make the still weaker solutions. This was then carried on down to 5 per cent., and from that the 2½ per cent. solution was made. Then from the 2½ per cent. the 1 per cent. solution was made; from the 1 per cent. the ½ per cent., and from the ½ per cent. the 1/10 per cent. solution. This method, and the use of a cc. graduate measure were calculated to insure exactness. This plan was also followed in making the solutions of the mouth-washes.

The plan already mentioned with reference to the tooth sections was now followed. Each day the section was removed from the test tube, compared with the control, and results were marked on a series of charts which I prepared for the purpose. These charts were prepared with the original intention of continuing the test for thirty days, but marked results were obtained in most instances in ten days, while staining in some cases was noticed in a few hours. At the end of ten days all the sections were removed from the solutions. I have in my possession the teeth which were used in these experiments.

Staining results noted. These charts are self-explanatory. They show that staining was produced by all the coloring agents experimented with, even including the 1/10 per cent. solutions, with the exception of tannic acid. I was surprised to find that staining was in many instances accomplished to an equal or occasionally an even greater extent with the weaker solutions than with those of full strength. According to the table previously given, the coloring agents are used in dentifrices in from about ¼ to 5 per cent. strength, depending on the agent used and the shade desired, so that charts Nos. V to IX inclusive nearly cover the whole range.

Some variation in the amount of staining in the solutions of various strengths may be attributed to variations in the character of the tooth structure experimented with, some teeth seeming to stain more readily than others.

Chinosol, tannin, tincture of krameria, and fluid extract of wild indigo are not coloring agents *per se*, but owing to their characteristic color were experimented with in order to learn just what results would be obtained. Chinosol is an antiseptic of the coal-tar class, of a lemon yellow color, and is used in about 1 per cent. strength as a constituent of some mouth-washes on account of its germicidal properties. Discoloration of the enamel, dentin, and cementum was produced in one day by a 1/10 per cent. solution of this agent. It will be noticed that no discoloration was observed with tannic acid in the percentage solutions in which it is being used in mouth-washes. At the same time there is a possibility of its producing discoloration in the mouth through its union with blood or other substances containing iron, with the production of iron tannate. Staining of the enamel was produced in two days with tincture of krameria in 1/10 per cent. solution. There is also a possibility of the production of iron tannate with this agent and others of similar nature, such as catechu, kino, etc., through the same reaction as mentioned before in connection with tannic acid, all of these depending on the presence of tannin for their astringent properties. Fluid extract of wild indigo, not primarily a staining agent, but an astringent, produced discoloration of enamel in a 1/10 per cent. solution in two days. The cementum in most instances was found to be most susceptible to the stains, the dentin less so, and the enamel least. In quite a number of cases, however, the dentin seems to take the stain more rapidly and perceptibly than the cementum. In a few of the sections used, a piece of the alveolar process was left still adhering, and in these it was found that the bony tissue was most susceptible of all to staining.

Another significant fact observed was

(I.)

COLORING AGENTS—FULL STRENGTH.

DAYS	1			2			3			4			5			6			7			8			9			10		
Structure affected...	E	D	C	E	D	C	E	D	C	E	D	C	E	D	C	E	D	C	E	D	C	E	D	C	E	D	C	E	D	C
Carmine	+	+1	+1	+	+1	+1	+1	+2	+2	+1	+3	+2	+1	+3	+3	+2	+4	+3	+3	+4	+4	+3	+4	+4	+3	+4	+4	+3	+4	+4
Tinct. cudbear	+	+1	+1	+	+1	+1	+1	+2	+2	+1	+3	+2	+1	+3	+3	+2	+4	+3	+3	+4	+4	+3	+4	+4	+4	+4	+4	+4	+5	+5
Alkanet	+	+1	+1	+1	+2	+2	+1	+2	+2	+1	+3	+2	+1	+3	+3	+2	+4	+3	+4	+5	+5	+4	+5	+5	+5	+5	+5	+5	+5	+5
Hematoxylon	+	+1	+1	+	+1	+1	+	+1	+1	+1	+3	+2	+1	+3	+2	+2	+4	+4	+3	+5	+5	+4	+5	+5	+4	+5	+5	+4	+5	+5
Red saunders	+	+1	+	+	+1	+	+	+1	+1	+	+2	+1	+	+3	+2	+1	+2	+3	+2	+2	+3	+2	+2	+3	+3	+4	+4	+3	+4	+4
Tinct. saffron	+	+1	+1	+	+1	+1	+1	+2	+2	+1	+3	+2	+1	+3	+3	+2	+4	+4	+3	+4	+4	+3	+4	+4	+3	+4	+4	+3	+4	+4
Wild indigo	+	+1	+1	+	+1	+1	+	+1	+1	+	+2	+1	+	+2	+1	+	+2	+2	+2	+3	+3	+2	+3	+3	+3	+3	+3	+3	+4	+4
Caramel solution	+	+1	+1	+	+2	+1	+1	+2	+2	+1	+2	+2	+1	+3	+2	+1	+3	+3	+1	+3	+3	+1	+3	+3	+2	+3	+3	+2	+3	+3
Chlorophyl	–	+	+	+	+1	+1	+	+1	+1	+	+1	+1	+	+2	+2	+1	+3	+2	+3	+4	+4	+3	+4	+4	+4	+4	+4	+5	+5	+5
Indigo	±	+	+	±	+	+	±	+	+	±	+1	+1	±	+2	+1	+	+3	+2	+2	+3	+2	+2	+3	+2	+2	+3	+3	+2	+3	+3
Roseanilin	+	+1	+1	+	+1	+1	+1	+2	+2	+1	+3	+2	+2	+3	+3	+2	+4	+3	+3	+4	+4	+3	+4	+4	+4	+5	+5	+4	+5	+5
Methyl violet	+	+1	+1	+	+1	+1	+1	+2	+2	+1	+3	+2	+2	+4	+3	+2	+4	+3	+3	+4	+4	+3	+4	+4	+4	+5	+5	+4	+5	+5
Tannic acid	–	–	–	–	–	–	–	–	–	–	±	–	–	±	–	–	±	±	–	±	±	–	±	±	–	±	±	–	±	±
Tinct. krameria	+	+1	+1	+	+1	+1	+	+1	+1	+1	+3	+2	+1	+4	+3	+1	+4	+3	+2	+4	+3	+2	+4	+3	+3	+4	+4	+3	+4	+4
Chinosol	+	+	+1	+	+	+1	+	+1	+1	+1	+2	+2	+1	+3	+2	+2	+4	+3	+3	+4	+3	+3	+4	+3	+3	+4	+4	+5	+5	+5

KEY TO SIGNS: – no result. ± very slight. + slight. +1 medium. +2 marked. +3 well marked. +4 very marked. +5 excessive.
E, enamel. D, dentin. C, cementum.

(II.)

COLORING AGENTS—50 PER CENT. SOLUTION.

DAYS	1			2			3			4			5			6			7			8			9			10		
Structure affected...	E	D	C	E	D	C	E	D	C	E	D	C	E	D	C	E	D	C	E	D	C	E	D	C	E	D	C	E	D	C
Carmine	+	+1	+1	+	+1	+1	+1	+2	+2	+1	+3	+2	+1	+3	+3	+2	+4	+3	+2	+4	+3	+2	+4	+4	+3	+4	+4	+3	+4	+4
Tinct. cudbear	+	+1	+1	+	+1	+1	+1	+2	+2	+1	+3	+2	+1	+3	+3	+2	+4	+3	+3	+4	+3	+3	+4	+3	+3	+4	+4	+4	+5	+5
Alkanet	+	+1	+1	+	+1	+1	+1	+2	+2	+1	+3	+2	+1	+3	+3	+2	+4	+3	+3	+4	+4	+3	+4	+4	+3	+4	+4	+3	+4	+4
Hematoxylon	+	+1	+1	+	+1	+1	+	+1	+1	+1	+3	+2	+1	+3	+3	+2	+4	+3	+3	+4	+4	+3	+4	+4	+3	+4	+4	+3	+5	+5
Red saunders	+	+1	+	+	+1	+1	+	+1	+1	+	+2	+1	+	+2	+2	+1	+3	+2	+2	+3	+3	+2	+3	+3	+2	+3	+3	+2	+4	+4
Tinct. saffron	+	+1	+1	+	+1	+1	+1	+2	+2	+1	+3	+2	+1	+3	+3	+2	+4	+3	+2	+4	+3	+3	+4	+4	+3	+4	+4	+3	+4	+4
Wild indigo	+	+1	+1	+	+1	+1	+	+1	+1	+	+2	+1	+	+3	+2	+1	+3	+3	+2	+3	+3	+2	+3	+3	+2	+3	+3	+2	+3	+3
Caramel solution	+	+1	+1	+	+2	+1	+	+2	+2	+1	+3	+2	+1	+3	+3	+2	+4	+3	+2	+4	+3	+3	+4	+3	+3	+4	+3	+3	+4	+4
Chlorophyl	−	+	+	±	+	+	+	+1	+1	+	+1	+1	+1	+2	+2	+1	+3	+3	+2	+3	+3	+3	+4	+4	+3	+4	+4	+3	+4	+4
Indigo	±	+	+	±	+	+	±	+	+	±	+1	+1	±	+1	+1	±	+2	+2	+2	+2	+2	+2	+3	+2	+2	+3	+3	+3	+4	+4
Roseanilin	+	+1	+1	+	+1	+1	+1	+2	+2	+1	+3	+2	+1	+3	+3	+2	+3	+3	+3	+4	+4	+3	+4	+4	+3	+4	+4	+4	+5	+5
Methyl violet	+	+1	+1	+	+1	+1	+1	+2	+2	+1	+3	+2	+1	+3	+3	+2	+3	+3	+3	+4	+4	+4	+5	+5	+5	+5	+5	+5	+5	+5
Tannic acid	−	−	−	−	−	−	−	−	−	−	±	−	−	±	−	−	±	±	−	±	±	−	±	±	−	±	±	−	±	±
Tinct. krameria	+	+1	+1	+	+1	+1	+	+1	+1	+1	+3	+2	+1	+3	+3	+2	+3	+3	+2	+3	+3	+3	+4	+4	+3	+5	+4	+3	+5	+5
Chinosol	+	+	+1	+	+	+1	+	+1	+1	+1	+2	+2	+1	+3	+2	+2	+3	+3	+3	+2	+3	+3	+3	+3	+3	+3	+3	+3	+3	+3

KEY TO SIGNS: − no result. ± very slight. + slight. +1 medium. +2 marked. +3 well marked. +4 very marked. +5 excessive.
E, enamel. D, dentin. C, cementum.

(III.)

COLORING AGENTS—25 PER CENT. SOLUTION.

DAYS	1			2			3			4			5			6			7			8			9			10		
Structure affected...	E	D	C	E	D	C	E	D	C	E	D	C	E	D	C	E	D	C	E	D	C	E	D	C	E	D	C	E	D	C
Carmine	+	+1	+1	+	+1	+1	+	+2	+2	+1	+3	+2	+1	+3	+2	+1	+4	+3	+2	+4	+3	+3	+4	+3	+3	+4	+4	+4	+5	+5
Tinct. cudbear	+	+1	+1	+	+1	+1	+	+2	+2	+1	+3	+2	+1	+3	+2	+1	+3	+3	+2	+3	+3	+3	+4	+3	+3	+4	+4	+3	+4	+4
Alkanet	+	+1	+1	+	+1	+1	+	+2	+2	+1	+3	+2	+1	+3	+2	+1	+4	+3	+2	+4	+3	+2	+4	+4	+3	+4	+4	+3	+4	+4
Hematoxylon	±	+	+1	+	+1	+1	+	+1	+1	+1	+2	+2	+1	+2	+3	+1	+4	+3	+3	+5	+3	+3	+5	+3	+3	+5	+4	+4	+5	+5
Red saunders	+	+1	+	+	+1	+1	+	+2	+2	+	+2	+2	+2	+2	+2	+2	+2	+2	+3	+3	+3	+3	+3	+3	+3	+3	+3	+4	+4	+4
Tinct. saffron	+	+1	+1	+	+1	+1	+	+2	+2	+1	+3	+2	+2	+3	+2	+2	+3	+2	+2	+3	+3	+2	+3	+3	+2	+3	+3	+2	+3	+3
Wild indigo	±	+1	+	+	+1	+1	+	+1	+1	+1	+2	+2	+1	+2	+2	+1	+2	+2	+2	+3	+3	+2	+3	+3	+2	+3	+3	+3	+3	+3
Caramel solution	±	+1	+	+	+1	+1	+	+2	+2	+1	+3	+2	+1	+3	+2	+1	+4	+3	+2	+4	+3	+2	+4	+3	+3	+4	+4	+3	+4	+4
Chlorophyl	–	+	+	±	+	+	±	+1	+1	±	+1	+1	±	+1	+1	+	+1	+1	+2	+3	+3	+2	+3	+3	+3	+3	+3	+3	+4	+4
Indigo	±	+	+	±	+	+	±	+	+	±	+1	+1	+	+1	+1	+	+1	+1	+2	+3	+3	+2	+3	+3	+3	+3	+3	+3	+4	+4
Roseanilin	+	+1	+1	+	+1	+1	+	+2	+2	+1	+3	+2	+1	+3	+2	+1	+3	+2	+2	+3	+3	+3	+4	+4	+3	+4	+4	+4	+5	+5
Methyl violet	+	+1	+1	+	+1	+1	+	+2	+2	+1	+3	+2	+1	+3	+2	+1	+4	+3	+3	+4	+4	+3	+4	+4	+3	+5	+5	+4	+5	+5
Tannic acid	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Tinct. krameria	±	+1	+1	+	+1	+1	+	+2	+2	+1	+3	+2	+1	+3	+2	+1	+3	+2	+2	+3	+3	+2	+3	+3	+2	+3	+3	+2	+3	+3
Chinosol	+	+	+1	+	+1	+1	+	+1	+1	+1	+2	+2	+1	+2	+2	+1	+2	+2	+2	+3	+3	+3	+3	+3	+4	+4	+4	+5	+5	+5

KEY TO SIGNS: – no result. ± very slight. + slight. +1 medium. +2 marked. +3 well marked. +4 very marked. +5 excessive.
E, enamel. D, dentin. C, cementum.

(IV.)

COLORING AGENTS—10 PER CENT. SOLUTION.

DAYS	1			2			3			4			5			6			7			8			9			10		
Structure affected...	E	D	C	E	D	C	E	D	C	E	D	C	E	D	C	E	D	C	E	D	C	E	D	C	E	D	C	E	D	C
Carmine	±	+	+	±	+	+	±	+	+	+	+1	+1	+	+2	+1	+2	+3	+3	+2	+3	+3	+2	+3	+3	+3	+4	+4	+3	+5	+5
Tinct. cudbear	+	+1	+1	+	+1	+1	+	+1	+1	+	+1	+1	+	+2	+1	+1	+2	+1	+1	+2	+1	+1	+3	+2	+2	+3	+3	+2	+3	+3
Alkanet	+	+1	+1	+	+1	+1	+	+1	+1	+	+1	+1	+	+2	+1	+2	+3	+2	+2	+3	+2	+2	+3	+3	+3	+4	+4	+3	+5	+5
Hematoxylon	+	+1	+1	+	+1	+1	+	+1	+1	+	+1	+1	+	+2	+1	+1	+2	+1	+1	+2	+1	+2	+3	+2	+2	+3	+3	+3	+5	+4
Red saunders	±	+	+	±	+	+	±	+	+	±	+	+	±	+1	+1	+1	+2	+2	+2	+2	+2	+2	+3	+3	+3	+3	+3	+3	+3	+3
Tinct. saffron	+	+1	+1	+	+1	+1	+	+1	+1	+	+1	+1	+	+2	+1	+1	+2	+2	+1	+2	+2	+1	+2	+2	+2	+3	+3	+2	+3	+3
Wild indigo	±	+	+	±	+	+	±	+	+	±	+	+	±	+1	+1	±	+2	+1	±	+2	+1	+	+3	+2	+1	+3	+2	+2	+3	+3
Caramel solution	+	+1	+	+	+1	+1	+	+1	+1	+	+1	+1	+	+2	+2	+2	+3	+2	+2	+3	+2	+2	+3	+2	+2	+3	+3	+3	+3	+3
Chlorophyl	±	+	+	±	+	+	±	+	+	±	+	+	±	+1	+1	+1	+1	+1	+2	+1	+1	+2	+3	+3	+2	+3	+3	+3	+4	+4
Indigo	±	+	+	±	+	+	±	+	+	±	+	+	±	+1	+1	+1	+1	+1	+1	+1	+1	+1	+2	+2	+2	+3	+3	+2	+3	+3
Roseanilin	+	+1	+1	+	+1	+1	+	+1	+1	+	+1	+1	+1	+2	+2	+2	+3	+3	+2	+3	+3	+3	+4	+4	+3	+4	+4	+3	+5	+5
Methyl violet	+	+1	+1	+	+1	+1	+	+1	+1	+	+1	+1	+1	+2	+2	+2	+3	+3	+2	+4	+3	+2	+4	+3	+3	+4	+4	+3	+5	+5
Tannic acid	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	±	±	–	±	±
Tinct. krameria	+	+1	+1	+	+1	+1	+	+1	+1	+	+1	+1	+	+2	+2	+1	+2	+2	+2	+3	+3	+2	+3	+3	+2	+4	+3	+2	+4	+3
Chinosol	+	+1	+1	+	+1	+1	+	+1	+1	+	+1	+1	+	+2	+2	+1	+3	+2	+1	+3	+2	+2	+3	+3	+2	+3	+3	+2	+3	+3

KEY TO SIGNS: – no result. ± very slight. + slight. +1 medium. +2 marked. +3 well marked. +4 very marked. +5 excessive.
E, enamel. D, dentin. C, cementum.

(V.)

COLORING AGENTS—5 PER CENT. SOLUTION.

DAYS	1			2			3			4			5			6			7			8			9			10		
Structure affected...	E	D	C	E	D	C	E	D	C	E	D	C	E	D	C	E	D	C	E	D	C	E	D	C	E	D	C	E	D	C
Carmine	±	+	+	+	+2	+1	+1	+3	+2	+2	+3	+3	+2	+3	+3	+2	+3	+3	+3	+4	+4	+3	+4	+4	+3	+5	+4	+4	+5	+5
Tinct. cudbear	±	+	+	+	+1	+1	+	+2	+1	+2	+3	+3	+2	+3	+3	+2	+3	+3	+3	+4	+4	+3	+4	+4	+3	+4	+4	+3	+5	+4
Alkanet	±	+	+	+	+1	+1	+	+2	+1	+1	+2	+2	+2	+3	+3	+2	+3	+3	+2	+3	+4	+3	+4	+4	+3	+4	+4	+4	+5	+5
Hematoxylon	±	+	+	+	+1	+1	+	+3	+2	+3	+4	+4	+3	+4	+4	+3	+4	+4	+3	+4	+4	+3	+4	+4	+3	+4	+4	+4	+5	+5
Red saunders	–	–	–	–	–	–	–	±	±	±	±	±	±	+	+	+1	+2	+2	+2	+3	+3	+2	+3	+3	+2	+3	+3	+3	+4	+4
Tinct. saffron	–	±	±	+	±	±	+	+1	+1	+	+1	+1	+	+1	+1	+	+1	+1	+1	+2	+2	+2	+3	+2	+2	+3	+3	+2	+4	+3
Wild indigo	–	±	±	–	±	±	±	+	+	±	+	+	±	+1	+	+	+1	+1	+	+2	+1	+1	+2	+2	+1	+2	+2	+1	+3	+2
Caramel solution	±	+	+	±	+	+	±	+1	+1	+	+2	+1	+	+2	+1	+1	+2	+2	+1	+3	+2	+2	+3	+3	+2	+4	+3	+3	+5	+4
Chlorophyl	–	±	±	±	+	+	±	+	+	+1	+2	+2	+2	+3	+3	+3	+4	+4	+3	+4	+4	+3	+4	+4	+3	+4	+4	+3	+5	+4
Indigo	–	–	–	±	±	±	±	±	±	±	+1	+1	±	+1	+1	+	+1	+1	+1	+2	+2	+1	+2	+2	+1	+3	+3	+1	+3	+3
Roseanilin	+	+1	+1	+	+1	+1	+1	+3	+2	+2	+3	+2	+2	+3	+3	+3	+4	+4	+3	+4	+4	+3	+4	+4	+4	+5	+5	+4	+5	+5
Methyl violet	+	+1	+1	+	+1	+1	+1	+3	+2	+2	+3	+2	+2	+4	+3	+3	+4	+4	+3	+5	+4	+3	+5	+5	+4	+5	+5	+4	+5	+5
Tannic acid	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Tinct. krameria	±	+	+	±	+	+	+	+2	+1	+1	+2	+2	+1	+2	+2	+2	+3	+3	+2	+3	+3	+2	+3	+3	+2	+3	+3	+3	+4	+4
Chinosol	–	±	±	–	±	±	±	+1	+	±	+2	+2	±	+2	+2	+1	+2	+2	+2	+3	+3	+2	+3	+3	+3	+4	+4	+3	+4	+4

KEY TO SIGNS: – no result. ± very slight. + slight. +1 medium. +2 marked. +3 well marked. +4 very marked. +5 excessive.
E, enamel. D, dentin. C, cementum.

(VI.)

COLORING AGENTS—2½ PER CENT. SOLUTION.

DAYS	1			2			3			4			5			6			7			8			9			10		
Structure affected...	E	D	C	E	D	C	E	D	C	E	D	C	E	D	C	E	D	C	E	D	C	E	D	C	E	D	C	E	D	C
Carmine	−	±	±	±	+1	+1	+1	+2	+2	+2	+3	+3	+3	+4	+4	+3	+4	+4	+3	+4	+4	+3	+5	+4	+3	+5	+5	+3	+5	+5
Tinct. cudbear	−	±	±	±	+	+	+	+1	+	+1	+2	+1	+2	+3	+2	+2	+3	+2	+2	+3	+3	+3	+3	+3	+4	+4	+4	+4	+4	+4
Alkanet	−	±	±	±	+	+	+1	+2	+2	+2	+3	+3	+2	+3	+3	+3	+4	+4	+3	+4	+4	+4	+4	+4	+4	+4	+4	+4	+4	+4
Hematoxylon	−	−	−	−	±	±	+1	+2	+2	+2	+3	+2	+2	+3	+3	+2	+3	+3	+3	+3	+3	+3	+4	+3	+3	+4	+3	+3	+4	+4
Red saunders	−	−	−	−	±	−	±	+1	+1	+1	+1	+1	+1	+1	+1	+1	+2	+1	+2	+3	+3	+2	+3	+3	+3	+4	+4	+3	+4	+4
Tinct. saffron	−	−	−	−	±	+	±	+1	+1	±	+1	+1	+	+1	+1	+	+2	+1	+	+2	+1	+	+2	+2	+1	+2	+2	+1	+2	+2
Wild indigo	−	−	−	−	±	−	±	+1	+	±	+1	+	+	+2	+1	+1	+2	+1	+1	+2	+1	+1	+2	+2	+2	+3	+3	+2	+3	+3
Caramel solution	−	−	−	−	±	−	±	+1	+1	±	+1	+1	+1	+2	+2	+1	+2	+2	+1	+2	+2	+2	+3	+3	+2	+3	+3	+3	+3	+3
Chlorophyl	−	±	±	±	+	+	±	+2	+2	+	+2	+2	+2	+3	+3	+2	+3	+3	+2	+3	+3	+2	+3	+3	+3	+4	+4	+3	+4	+4
Indigo	−	±	±	±	+1	+	±	+1	+	+	+1	+1	+	+1	+1	+	+1	+1	+1	+2	+2	+1	+2	+2	+2	+2	+2	+2	+2	+2
Roseanilin	+	+1	+1	+1	+3	+2	+2	+3	+3	+2	+3	+3	+3	+4	+4	+3	+4	+4	+3	+4	+4	+3	+4	+4	+3	+4	+4	+4	+4	+4
Methyl violet	+	+1	+1	+1	+3	+2	+1	+3	+2	+2	+4	+3	+2	+4	+3	+3	+4	+3	+3	+4	+4	+3	+4	+4	+4	+5	+5	+4	+5	+5
Tannic acid	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−
Tinct. krameria	−	±	−	−	±	±	±	+	+	±	+1	+1	+	+1	+1	+1	+2	+1	+1	+2	+2	+2	+2	+2	+3	+3	+3	+3	+4	+3
Chinosol	−	±	±	−	±	±	+1	+2	+2	+2	+2	+2	+2	+3	+2	+2	+3	+2	+2	+3	+2	+2	+3	+3	+3	+3	+3	+3	+3	+3

KEY TO SIGNS: − no result. ± very slight. + slight. +1 medium. +2 marked. +3 well marked. +4 very marked. +5 excessive.
E, enamel. D, dentin. C, cementum.

(VII.)

Coloring Agents—1 per cent. Solution.

Days	1			2			3			4			5			6			7			8			9			10		
Structure affected	E	D	C	E	D	C	E	D	C	E	D	C	E	D	C	E	D	C	E	D	C	E	D	C	E	D	C	E	D	C
Carmine	±	±	±	±	+1	+1	+1	+3	+2	+2	+3	+3	+2	+3	+3	+3	+4	+4	+3	+4	+4	+4	+4	+4	+4	+5	+5	+4	+5	+5
Tinct. cudbear	±	±	−	±	±	±	+	+1	+1	+1	+2	+1	+2	+3	+3	+2	+3	+3	+2	+3	+3	+2	+3	+3	+3	+4	+3	+3	+4	+3
Alkanet	±	±	±	±	+	+	+1	+2	+2	+2	+3	+2	+2	+3	+3	+2	+3	+3	+2	+3	+3	+3	+3	+3	+3	+4	+3	+3	+4	+3
Hematoxylon	−	−	−	−	±	±	+	+1	+1	+1	+2	+1	+1	+2	+2	+2	+2	+2	+2	+3	+3	+2	+3	+3	+3	+3	+3	+3	+3	+3
Red saunders	−	−	−	−	−	−	±	+	+	±	+	+	+1	+2	+2	+1	+2	+2	+2	+3	+3	+2	+3	+3	+3	+3	+3	+3	+4	+3
Tint. saffron	−	−	−	−	±	−	±	+	+	+	+1	+1	+	+1	+1	+	+1	+1	+1	+2	+2	+1	+2	+2	+1	+2	+2	+2	+2	+2
Wild indigo	−	−	−	−	−	−	±	+	+	±	+1	+	+	+2	+1	+	+2	+2	+1	+2	+2	+1	+2	+2	+2	+2	+2	+2	+3	+2
Caramel solution	−	−	−	−	−	−	±	+	+	+	+1	+1	+1	+2	+2	+2	+2	+2	+2	+2	+2	+2	+2	+2	+2	+2	+2	+2	+2	+2
Chlorophyl	−	±	±	±	+	+	+	+1	+1	+1	+2	+2	+2	+3	+3	+2	+3	+3	+2	+3	+3	+2	+3	+3	+3	+3	+3	+3	+4	+3
Indigo	−	±	±	±	+	+	+	+1	+1	+1	+2	+2	+1	+2	+2	+1	+2	+2	+1	+2	+2	+1	+2	+2	+2	+2	+2	+2	+2	+2
Roseanilin	+	+1	+1	+1	+3	+2	+1	+3	+3	+2	+4	+3	+3	+4	+4	+3	+4	+4	+3	+4	+4	+3	+4	+4	+4	+4	+4	+4	+4	+4
Methyl violet	+	+1	+1	+	+1	+1	+1	+2	+2	+2	+3	+3	+3	+4	+4	+3	+4	+4	+3	+4	+4	+3	+4	+4	+4	+5	+5	+4	+5	+5
Tannic acid	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−
Tinct. krameria	−	±	−	−	±	±	±	+1	+	+	+2	+1	+1	+2	+2	+1	+3	+2	+2	+3	+2	+2	+3	+2	+2	+3	+3	+2	+3	+3
Chinosol	−	±	−	−	±	±	+	+1	+1	+1	+2	+2	+2	+2	+2	+2	+3	+3	+3	+3	+3	+3	+3	+3	+3	+3	+3	+3	+3	+3

Key to Signs: − no result. ± very slight. + slight. +1 medium. +2 marked. +3 well marked. +4 very marked. +5 excessive.
E, enamel. D, dentin. C, cementum.

(VIII.)

Coloring Agents—One-half per cent. Solution.

Days	1			2			3			4			5			6			7			8			9			10		
Structure affected...	E	D	C	E	D	C	E	D	C	E	D	C	E	D	C	E	D	C	E	D	C	E	D	C	E	D	C	E	D	C
Carmine	±	+1	+1	+	+1	+1	+1	+2	+2	+2	+3	+3	+2	+3	+3	+3	+3	+3	+3	+4	+4	+3	+4	+4	+3	+4	+4	+4	+4	+4
Tinct. cudbear	±	+1	+1	+	+1	+1	+1	+2	+2	+2	+3	+3	+2	+3	+3	+2	+3	+3	+3	+3	+3	+3	+4	+4	+3	+4	+4	+4	+4	+4
Alkanet	+1	+1	+1	+1	+2	+1	+2	+2	+2	+3	+3	+3	+3	+3	+3	+4	+4	+4	+4	+4	+4	+4	+5	+4	+4	+5	+4	+4	+5	+5
Hematoxylon	±	±	±	±	+1	+	+	+1	+	+1	+2	+2	+2	+3	+3	+3	+3	+3	+3	+4	+4	+3	+4	+4	+3	+4	+4	+3	+4	+5
Red saunders	–	±	±	±	+1	+1	+	+2	+2	+2	+3	+3	+2	+3	+3	+3	+3	+3	+3	+3	+3	+3	+4	+4	+3	+4	+4	+4	+5	+5
Tinct. saffron	–	±	±	–	±	±	–	±	±	–	±	±	–	±	±	±	±	±	±	+	+	+	+1	+1	+1	+2	+2	+2	+2	+2
Wild indigo	–	±	±	±	+	+	+	+1	+1	+1	+2	+2	+1	+2	+2	+1	+2	+2	+2	+2	+2	+2	+2	+2	+2	+2	+2	+2	+3	+3
Caramel solution	±	±	±	+	+1	+	+	+1	+	+	+1	+1	+1	+2	+1	+2	+2	+2	+2	+2	+2	+2	+3	+3	+3	+3	+3	+3	+3	+3
Chlorophyl	±	±	±	+	+1	+1	+	+2	+1	+1	+2	+2	+2	+2	+2	+3	+3	+3	+3	+3	+3	+3	+3	+3	+3	+4	+4	+3	+4	+4
Indigo	–	–	±	±	+	+	+	+1	+1	+1	+1	+1	+1	+2	+1	+1	+2	+1	+1	+2	+2	+2	+2	+2	+2	+2	+2	+2	+2	+2
Roseanilin	±	+1	+1	+	+1	+1	+1	+3	+3	+2	+3	+3	+2	+3	+3	+2	+3	+3	+3	+3	+3	+3	+4	+3	+3	+4	+4	+3	+4	+4
Methyl violet	+1	+3	+2	+1	+3	+2	+2	+4	+3	+2	+4	+4	+3	+4	+4	+3	+4	+4	+3	+4	+4	+3	+4	+4	+4	+4	+4	+4	+5	+5
Tannic acid	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Tinct. krameria	±	±	±	+	+	+	+1	+1	+1	+1	+2	+2	+2	+3	+3	+3	+3	+3	+3	+4	+3	+3	+4	+4	+3	+4	+4	+4	+4	+4
Chinosol	+1	±	+1	+2	+1	+1	+2	+1	+1	+2	+1	+1	+3	+2	+2	+3	+2	+2	+3	+2	+2	+3	+2	+2	+3	+2	+2	+3	+2	+2

Key to Signs: – no result. ± very slight. + slight. +1 medium. +2 marked. +3 well marked. +4 very marked. +5 excessive.
E, enamel. D, dentin. C, cementum.

(IX.)

COLORING AGENTS—ONE-TENTH PER CENT. SOLUTION.

DAYS	1			2			3			4			5			6			7			8			9			10		
Structure affected...	E	D	C	E	D	C	E	D	C	E	D	C	E	D	C	E	D	C	E	D	C	E	D	C	E	D	C	E	D	C
Carmine	±	±	+1	+	+2	+	+	+2	+1	+1	+2	+1	+1	+3	+2	+2	+3	+2	+2	+3	+2	+2	+3	+3	+2	+4	+3	+3	+4	+3
Tinct. cudbear	–	–	+1	–	+	+1	±	+1	+1	+	+1	+1	+	+1	+1	+	+2	+1	+1	+2	+1	+1	+2	+2	+2	+2	+2	+2	+3	+2
Alkanet	–	±	–	–	+1	+	±	+1	+	+	+1	+1	+	+1	+1	+	+2	+1	+	+2	+1	+1	+2	+2	+1	+2	+2	+2	+2	+2
Hematoxylon	±	±	±	+	+	±	+	+	±	+1	+2	+1	+2	+2	+2	+3	+3	+3	+3	+3	+3	+3	+3	+3	+3	+3	+3	+3	+3	+3
Red saunders	–	±	+	±	+	+	+1	+1	+	+2	+3	+2	+2	+3	+2	+2	+3	+3	+3	+3	+3	+3	+3	+3	+3	+4	+3	+3	+4	+4
Tinct. saffron	–	±	±	±	+	+	±	+	+	+	+1	+1	+	+1	+1	+1	+1	+1	+1	+1	+1	+1	+2	+1	+1	+2	+2	+2	+2	+2
Wild indigo	–	–	–	±	+	+	±	+	+	+	+1	+1	+	+2	+1	+1	+2	+1	+1	+2	+2	+2	+3	+3	+2	+3	+3	+3	+3	+3
Caramel solution	±	±	±	±	+	+	±	+	+	+	+1	+1	+	+1	+1	+	+1	+1	+	+1	+1	+1	+2	+2	+1	+2	+2	+2	+2	+2
Chlorophyl	–	+1	+1	±	+1	+1	+	+2	+1	+1	+2	+2	+1	+3	+2	+2	+3	+2	+2	+3	+3	+2	+3	+3	+3	+3	+3	+3	+4	+4
Indigo	±	±	±	+	+	+	+	+	+	+	+	+	+	+	+	+1	+1	+1	+1	+1	+1	+1	+2	+2	+1	+2	+2	+2	+2	+2
Roseanilin	±	+1	+1	+	+1	+1	+	+1	+1	+1	+2	+2	+1	+3	+2	+2	+3	+3	+2	+3	+3	+2	+3	+3	+2	+3	+3	+2	+3	+3
Methyl violet	+1	+1	+1	+1	+2	+2	+2	+3	+2	+2	+3	+3	+3	+3	+3	+3	+3	+3	+3	+3	+3	+3	+4	+3	+3	+4	+4	+3	+4	+4
Tannic acid	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Tinct. krameria	–	–	–	±	+	+	±	+1	+	+	+1	+1	+1	+1	+1	+1	+2	+1	+1	+2	+1	+1	+2	+2	+2	+2	+2	+2	+2	+2
Chinosol	±	±	±	+	+	+	+	+	+	+1	+1	+1	+2	+2	+2	+2	+2	+2	+2	+2	+2	+3	+3	+3	+3	+3	+3	+3	+3	+3

KEY TO SIGNS: – no result. ± very slight. + slight. +1 medium. +2 marked. +3 well marked. +4 very marked. +5 excessive.
E, enamel. D, dentin. C, cementum.

that the neck of the tooth, just at the junction of the enamel and dentin, where recession of the gums begins in the mouth, was the most readily and quickly stained of any portion of the tooth. Roughened enamel surfaces, cracks in the enamel, pits and fissures, where the enamel is known to be frequently imperfect, cavities of decay, abraded and eroded surfaces, and the margins of fillings were noticeably subject to staining, these areas always staining more readily and to a greater extent.

The U. S. Department of Agriculture's Board of Food and Drug Inspection, in its food inspection decision No. 76—"Dyes, chemicals, and preservatives in foods"(1)—publishes a list of seven coal-tar dyes which it recommends as being harmless and allowable for coloring foods under the pure foods and drugs law. The list is as follows:

Red shades—107, Amaranth. 56, Ponceau 3R. 517, Erythrosin.

Orange shade—85, Orange 1.

Yellow shade—4, Naphthol yellow S.

Green shade—435, Light green S F, yellowish.

Blue shade—692, Indigo disulfo-acid.

Specimens of 107, 517, 85, 4, and 435 were obtained, and discoloration of the enamel, dentin, and cementum was noticed at the end of twenty-four hours' immersion in 1/10 per cent. solutions of these agents.

Experiments which will be mentioned later proved that the stains produced by these dyes are penetrating stains, practically unaffected by sunlight or continued washing. Erythrosin and probably one or two others of these dyes are being used as coloring agents in dentifrices.

(2) *Experiments with Mouth-washes.*

The mouth-washes already mentioned were experimented with in full strength, and in 50, 25, 10, and 5 per cent. solutions. The method of preparing these solutions has already been described, and the same method employed in staining the tooth sections as already mentioned was followed.

Kolynos was used as a kind of control, it being a typical wash of the colorless class, its color being a milky white. I was anxious to see just what results would be obtained. The charts show that in no instance did it produce discoloration. It will also be observed that some of the preparations exhibited quite a variation in the amount of discoloration produced in solutions of different strengths of the same agent. This is undoubtedly largely due to a difference in the character of the teeth experimented with.

Peroxident, Meade & Baker's Carbolic Mouth-wash, and Phénol Sodique, none of which (according to published formulæ) contain artificial coloring matters, and Lavoris and Thycalol, both of which are artificially colored, seemed to produce the greatest amount of discoloration. Mennen's Liquid Dentifrice, Rexall, and Colgate's Liquid Dentifrice caused the least staining, while the others seemed to occupy a medium ground. I was surprised at the somewhat negative results obtained with the Mennen preparation, after I had observed that a reddish deposit was present on the inside of the original bottle after its contents were removed, which was still noticeable after five minutes' washing with water. I was also startled by the great amount of staining produced by Peroxident, in view of the fact that it contains 20 per cent. of hydrogen dioxid, a bleaching agent. The marked staining produced by this agent, as well as by Meade & Baker's Carbolic Mouth-wash, neither of which are colored artificially, suggests the possibility that many drugs now incorporated in mouth-washes, although they are not primarily coloring agents, may produce harmful results through their staining property.

As will be seen from a study of the charts, staining of the dentin and cementum was produced in some instances by a 5 per cent. solution in two days (Thycalol and Meade & Baker's), while staining of the enamel with a solution of the same strength required three days (Thycalol and Saturol). Staining of the enamel was accomplished in one day by several others of the preparations in solutions of higher strength.

(X.)

MOUTH-WASHES—FULL STRENGTH.

DAYS	1			2			3			4			5			6			7			8			9			10		
Structure affected...	E	D	C	E	D	C	E	D	C	E	D	C	E	D	C	E	D	C	E	D	C	E	D	C	E	D	C	E	D	C
Sozodont	–	±	±	±	+1	+1	+	+1	+1	+	+1	+1	+	+1	+1	+1	+2	+2	+1	+3	+2	+1	+3	+3	+1	+3	+3	+2	+3	+3
Glycothymolin	–	±	±	–	+1	+	±	+1	+1	+	+1	+1	+	+1	+1	+1	+2	+2	+1	+2	+2	+2	+3	+3	+2	+3	+3	+2	+3	+3
Phénol Sodique	–	+	±	±	+1	+	±	+2	+1	+	+2	+2	+	+2	+2	+1	+3	+2	+2	+3	+3	+3	+3	+3	+3	+4	+4	+3	+4	+4
Rubyfoam	–	±	±	±	+1	+1	+	+1	+1	+1	+2	+2	+1	+2	+2	+2	+2	+2	+2	+2	+2	+3	+3	+3	+3	+3	+3	+3	+3	+3
Perfectine	–	–	–	–	±	–	±	+	+	+	+	+	+	+1	+1	+1	+1	+1	+1	+1	+1	+2	+2	+2	+2	+2	+2	+2	+2	+2
Meade & Baker's Carbolic Mouth-wash	–	±	±	–	+	+	±	+1	+1	+1	+2	+2	+1	+2	+2	+2	+3	+3	+2	+3	+3	+3	+4	+4	+3	+4	+4	+3	+4	+4
Colgate's Liq. Dentifrice	–	–	–	–	±	±	±	+	+	+	+1	+1	+1	+2	+2	+2	+2	+2	+2	+2	+2	+2	+3	+3	+3	+3	+3	+3	+3	+3
Peroxident	–	+	+	±	+4	+4	+	+4	+4	+1	+4	+4	+2	+4	+4	+2	+4	+4	+2	+4	+4	+3	+4	+4	+3	+4	+4	+3	+5	+5
Thycalol	–	±	±	±	+	+1	+	+1	+1	+	+1	+1	+	+2	+1	+1	+2	+1	+1	+2	+2	+2	+3	+3	+2	+3	+3	+2	+3	+3
Mennen's Liq. Dentifrice	–	±	–	±	+	±	±	+	±	±	+	±	±	+	±	±	+	±	±	+	±	±	+	±	+	+	+	+1	+1	+1
Lavoris	–	±	±	±	+1	+	+	+1	+1	+	+2	+1	+1	+2	+2	+2	+2	+2	+3	+3	+3	+4	+4	+4	+4	+4	+4	+4	+4	+4
Rexall Tooth-wash	–	–	–	–	+	+	–	+	+	±	+	+	±	+	+	+	+1	+1	+	+1	+1	+1	+1	+1	+1	+1	+1	+1	+1	+1
Saturol	–	–	–	±	±	±	±	±	±	+	+	+	+	+	+	+1	+1	+1	+2	+2	+2	+3	+3	+3	+3	+3	+3	+3	+3	+3
Kolynos	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–

KEY TO SIGNS: – no result. ± very slight. + slight. +1 medium. +2 marked. +3 well marked. +4 very marked. +5 excessive.
E, enamel. D, dentin. C, cementum.

(XI.)

Mouth-washes—50 per cent. Solution.

Days	1			2			3			4			5			6			7			8			9			10		
Structure affected...	E	D	C	E	D	C	E	D	C	E	D	C	E	D	C	E	D	C	E	D	C	E	D	C	E	D	C	E	D	C
Glycothymolin	±	+	+	+	+1	+	+	+1	+1	+1	+2	+2	+1	+2	+2	+2	+2	+2	+2	+2	+2	+2	+2	+2	+2	+3	+2	+3	+3	+3
Phénol Sodique	±	+	+	+	+	+	+	+1	+	+1	+2	+1	+1	+3	+1	+2	+3	+2	+2	+3	+3	+3	+3	+3	+3	+4	+4	+3	+4	+4
Rubyfoam	−	±	±	±	+	+	±	+	+	±	+1	+	±	+1	+1	+	+1	+1	+	+1	+1	+1	+2	+2	+2	+2	+2	+2	+3	+3
Perfectine	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	±	±	±	±	±	+	+	+
Meade & Baker's Carbolic Mouth-wash	−	±	±	±	+	+	+	+1	+1	+	+2	+2	+1	+2	+2	+2	+3	+2	+2	+3	+3	+3	+3	+3	+3	+3	+3	+3	+4	+4
Colgate's Liq. Dentifrice	−	±	±	−	±	±	−	±	±	−	±	±	±	±	±	+	+	+	+	+	+	+1	+1	+1	+1	+1	+1	+1	+1	+1
Peroxident	±	+	+	+	+1	+1	+1	+2	+2	+2	+3	+3	+2	+4	+3	+3	+4	+4	+3	+4	+4	+3	+4	+4	+3	+4	+4	+3	+5	+5
Thycalol	−	+1	+	±	+1	+	+	+1	+1	+	+2	+2	+2	+3	+3	+2	+3	+3	+2	+3	+3	+3	+3	+3	+3	+3	+3	+3	+4	+4
Kolynos	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−
Mennen's Liq. Dentifrice	−	−	−	−	±	+	±	+	+	±	+	+	±	+	+	+1	+1	+1	+1	+1	+1	+1	+1	+1	+1	+1	+1	+1	+2	+2
Lavoris	−	+	+	+	+1	+	+	+1	+1	+	+2	+1	+1	+2	+2	+2	+2	+2	+2	+2	+2	+3	+3	+3	+3	+3	+3	+3	+3	+3
Rexall Tooth-wash	−	−	−	−	±	−	±	+	+	±	+1	+	+	+1	+1	+1	+1	+1	+1	+1	+1	+2	+2	+2	+2	+2	+2	+3	+3	+3
Saturol	±	±	±	±	±	±	±	±	±	±	±	±	+	+	+	+1	+1	+1	+1	+1	+1	+1	+1	+1	+1	+1	+1	+2	+3	+3
Sozodont	−	±	±	±	+	+	±	+	+	+	+1	+1	+	+1	+1	+	+1	+1	+1	+2	+2	+1	+2	+2	+1	+2	+2	+1	+3	+3

Key to Signs: − no result. ± very slight. + slight. +1 medium. +2 marked. +3 well marked. +4 very marked. +5 excessive.
E, enamel. D, dentin. C, cementum.

(XII.)

MOUTH-WASHES—25 PER CENT. SOLUTION.

DAYS	1			2			3			4			5			6			7			8			9			10		
Structure affected...	E	D	C	E	D	C	E	D	C	E	D	C	E	D	C	E	D	C	E	D	C	E	D	C	E	D	C	E	D	C
Glycothymolin	–	–	–	–	±	–	±	+	+	±	+	+	+	+1	+1	+1	+2	+2	+1	+2	+2	+1	+2	+2	+1	+2	+2	+1	+2	+2
Phénol Sodique	–	±	±	±	+	+	±	+1	+1	+	+1	+1	+	+1	+1	+1	+2	+2	+1	+2	+2	+2	+3	+3	+2	+3	+3	+2	+3	+3
Rubyfoam	–	±	±	–	±	±	±	+	+	±	+1	+1	+	+1	+1	+1	+1	+1	+1	+2	+1	+2	+2	+2	+2	+2	+2	+2	+3	+3
Perfectine	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Meade & Baker's Carbolic Mouth-wash	±	+	+	+	+1	+1	+1	+1	+1	+2	+2	+2	+3	+3	+3	+3	+3	+3	+3	+3	+3	+3	+3	+3	+3	+4	+3	+4	+4	+4
Colgate's Liq. Dentifrice	–	–	–	–	±	–	±	+	+	±	+	+	+	+1	+1	+1	+2	+2	+1	+2	+2	+1	+2	+2	+1	+2	+2	+1	+2	+2
Peroxident	±	+	+	+	+1	+	+1	+2	+2	+1	+2	+2	+1	+3	+3	+2	+3	+3	+2	+3	+3	+2	+3	+3	+2	+3	+3	+2	+3	+3
Thycalol	–	+	+	–	+1	+1	±	+1	+1	+	+2	+2	+	+2	+2	+1	+3	+2	+1	+3	+3	+2	+3	+3	+2	+3	+3	+2	+3	+3
Kolynos	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Mennen's Liq. Dentifrice	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	±	±	±
Lavoris	–	±	–	±	+	+	±	+	+	±	+1	+1	±	+2	+1	+	+2	+1	+1	+2	+2	+1	+3	+2	+1	+3	+2	+1	+3	+2
Rexall Tooth-wash	–	–	–	–	±	–	±	±	±	±	+1	+1	±	+1	+1	+	+1	+1	+	+1	+1	+1	+1	+1	+1	+1	+1	+1	+1	+1
Saturol	–	–	–	–	±	±	–	±	±	±	+	+	±	+	+	+	+1	+1	+	+1	+1	+1	+2	+2	+1	+2	+2	+2	+2	+2
Sozodont	–	–	–	–	±	–	–	±	±	–	+	+	–	+	+	±	+	+	+	+1	+1	+	+1	+1	+	+1	+1	+	+1	+1

KEY TO SIGNS: – no result. ± very slight. + slight. +1 medium. +2 marked. +3 well marked. +4 very marked. +5 excessive.
E, enamel. D, dentin. C, cementum.

(XIII.)

MOUTH-WASHES—10 PER CENT. SOLUTION.

DAYS	1			2			3			4			5			6			7			8			9			10		
Structure affected...	E	D	C	E	D	C	E	D	C	E	D	C	E	D	C	E	D	C	E	D	C	E	D	C	E	D	C	E	D	C
Sozodont	–	–	–	–	±	–	±	+	+	+	+1	+1	+1	+2	+2	+1	+2	+2	+2	+2	+2	+2	+2	+2	+2	+2	+2	+2	+2	+2
Glycothymolin	–	–	–	–	±	±	–	±	±	±	+1	+1	±	+1	+1	+	+1	+1	+	+1	+1	+1	+1	+1	+1	+1	+1	+1	+2	+1
Phénol Sodique	–	–	–	±	+	+	±	+1	+1	+	+1	+1	+	+1	+1	+1	+1	+1	+1	+2	+1	+2	+2	+2	+2	+2	+2	+2	+2	+2
Rubyfoam	–	±	±	±	+1	+1	+	+1	+1	+	+2	+1	+1	+2	+1	+1	+2	+2	+1	+2	+2	+2	+2	+2	+2	+2	+2	+3	+3	+3
Perfectine	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Meade & Baker's Carbolic Mouth-wash	–	±	–	±	+1	+	+	+1	+1	+1	+2	+	+1	+2	+2	+2	+3	+3	+2	+3	+3	+2	+3	+3	+2	+3	+3	+2	+3	+3
Colgate's Liq. Dentifrice	–	–	–	–	±	–	–	±	±	–	±	±	–	+	±	±	+	+	+	+1	+	+	+1	+1	+	+1	+1	+	+1	+1
Peroxident	±	±	±	±	+	+	+	+1	+1	+1	+1	+1	+2	+2	+2	+2	+2	+2	+2	+3	+3	+2	+3	+3	+2	+3	+3	+2	+3	+3
Thycalol	–	±	±	±	+	+	±	+	+	+	+1	+1	+	+2	+1	+1	+2	+2	+1	+3	+3	+1	+3	+3	+2	+3	+3	+2	+3	+3
Kolynos	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Mennen's Liq. Dentifrice	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	±	+	+	±	+	+	+	+	+	+	+	+	+	+	+
Lavoris	–	–	–	–	±	–	±	+	+	±	+	+	+	+1	+1	+1	+2	+1	+1	+2	+1	+1	+2	+2	+1	+2	+2	+1	+2	+2
Rexall Tooth-wash	–	–	–	–	–	–	±	+	+	±	+	+	±	+1	+	+	+1	+1	+	+1	+1	+	+1	+1	+1	+1	+1	+1	+1	+1
Saturol	–	–	–	–	±	–	±	±	±	±	±	±	+	+	+	+	+	+	+1	+1	+1	+1	+1	+1	+1	+1	+1	+1	+1	+1

KEY TO SIGNS: – no result. ± very slight. + slight. +1 medium. +2 marked. +3 well marked. +4 very marked. +5 excessive.
E, enamel. D, dentin. C, cementum.

(XIV.)

MOUTH-WASHES—5 PER CENT. SOLUTION.

DAYS	1			2			3			4			5			6			7			8			9			10		
Structure affected...	E	D	C	E	D	C	E	D	C	E	D	C	E	D	C	E	D	C	E	D	C	E	D	C	E	D	C	E	D	C
Sozodont	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	±	+	+	+	+	+	+	+	+	+	+1	+1	+1	+1	+1
Glycothymolin	−	−	−	−	−	−	−	±	±	±	+	+	±	+	+	+	+1	+1	+	+1	+1	+	+1	+1	+1	+1	+1	+1	+1	+1
Phénol Sodique	−	−	−	−	−	−	−	±	±	±	+	+	±	+	+	+	+1	+1	+	+1	+1	+1	+1	+1	+1	+2	+1	+2	+2	+2
Rubyfoam	−	−	−	−	−	−	−	±	±	+	+1	+1	+	+1	+1	+2	+2	+2	+2	+2	+2	+2	+2	+2	+2	+3	+3	+2	+3	+3
Perfectine	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	±	+	+	±	+	+	+	+	+	+	+1	+1	+1	+1	+1
Meade & Baker's Carbolic Mouth-wash	−	−	−	−	±	±	−	+	±	±	+	+	+	+1	+1	+2	+2	+2	+2	+2	+2	+2	+2	+2	+2	+3	+3	+2	+3	+3
Colgate's Liq. Dentifrice	−	−	−	−	−	−	−	±	±	+	+1	+1	+	+1	+1	+1	+1	+1	+1	+2	+2	+1	+2	+2	+2	+2	+2	+2	+2	+2
Peroxident	−	−	−	−	−	±	−	−	±	−	±	±	−	±	±	+	+1	+1	+	+1	+1	+1	+1	+1	+1	+1	+1	+1	+2	+2
Thycalol	−	−	−	−	±	±	±	+1	+	+	+2	+1	+	+2	+2	+2	+3	+3	+2	+3	+3	+2	+3	+3	+2	+3	+3	+3	+3	+3
Kolynos	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−
Mennen's Liq. Dentifrice	−	−	−	−	−	−	−	±	−	±	+	+	±	+	+	+	+1	+1	+	+1	+1	+1	+1	+1	+1	+1	+1	+2	+1	+1
Lavoris	−	−	−	−	−	−	−	±	±	−	±	±	−	±	±	+	+1	+1	+	+1	+1	+1	+1	+1	+1	+1	+1	+1	+1	+1
Rexall Tooth-wash	−	−	−	−	−	−	−	−	−	±	+	+	±	+	+	+	+1	+	+	+1	+1	+1	+1	+1	+1	+1	+1	+1	+1	+1
Saturol	−	−	−	−	−	−	±	±	±	+	+	+	+	+	+	+1	+1	+1	+1	+1	+1	+1	+1	+1	+1	+2	+2	+2	+2	+2

KEY TO SIGNS: − no result. ± very slight. + slight. +1 medium. +2 marked. +3 well marked. +4 very marked. +5 excessive.
E, enamel. D, dentin. C, cementum.

The significant fact mentioned before in connection with the coloring agents was also apparent in the experiments with the mouth-washes, viz, discoloration was produced in a number of instances more slowly but to a greater extent with the weaker solutions than with the strong ones.

Dr. A. E. Osmond, hematologist of the Cincinnati City Hospital and professor of histology and bacteriology in the Ohio College of Dental Surgery, to whom I am indebted for valuable assistance in this work, informs me that this is a fact which is well known to hematologists with reference to staining blood cells for microscopical examination, and that much better results are obtained in their work by the use of the weaker solutions of the staining agents which they employ.

As will be observed, discoloration of enamel, dentin, and cementum was accomplished with all of the preparations of this class experimented with. Maximum results were obtained with Pâte Dentifrice, a French preparation, Oriental Tooth Paste, an English product, Banzai, a supposedly Japanese powder of a deep pink color, and Euthymol Tooth Paste, an American dentifrice. The least results were obtained with Oraline Tooth Paste and Woodbury's Dental Cream, Oraline producing very little discoloration of enamel, regardless of the fact that a saturated solution of it shows a brownish red color. I have been unable to discover what coloring agent is used in its manufacture, but whatever it is, it seems to stain least of any of the colored preparations I have experimented with.

(3) *Amount of Penetration and Action of Sunlight and Water on Stains.*

In order to test the permanence of the stains, a large number of whole teeth were immersed for ten days in many of the dyes (including those recommended in F. I. D. No. 76), also in a majority of the dentifrices. These were then exposed to the rays of the sun for seven successive days. Very little if any bleaching was apparent at the end of that time; in fact, the color in some instances seemed to be more fixed and deeper.

Whole teeth were then immersed in a large number of the solutions (both dyes and dentifrices being tested) for ten days, and then transverse sections made to observe the amount of penetration of the discoloration. Sections were made through the center of the crowns and roots. These evidenced the fact that the stain had penetrated the enamel, dentin, and cementum for quite a distance in each instance—in fact, some of the preparations had stained the tooth through and through.

Teeth which had been subjected to the action of many of the dentifrices and coloring matters for a week were then continuously washed in running filtered water for forty-eight hours, and at the end of that time no apparent change was noticeable.

(4) *Saliva Experiments.*

In addition to experimentation with watery solutions of the dentifrices, solutions in saliva of a number of them were also utilized. Practically the same results were obtained with these solutions, staining occurring in every instance, the saliva seeming not to modify in the least the results already obtained.

EXPERIMENTS AND OBSERVATIONS IN THE MOUTH.

The above laboratory experiments have conclusively proved that not only dentin, cementum, and bone, but enamel, is readily stained out of the mouth—staining of enamel tissue having been accomplished in every instance in which a colored preparation was employed. These stains, as has been demonstrated, were not superficial but penetrating stains, non-responsive to sunlight or continual washing. Staining of these tissues occurs also in the mouth from various causes in cases in which the enamel and dentin have lost their vitality through removal of the pulp, also in cases of vital teeth. In cases of staining from putrefactive decomposi-

(XV.)

SATURATED SOLUTIONS: TOOTH POWDERS—PASTES—SOAPS.

DAYS	1			2			3			4			5			6			7			8			9			10		
Tissue affected......	E	D	C	E	D	C	E	D	C	E	D	C	E	D	C	E	D	C	E	D	C	E	D	C	E	D	C	E	D	C
Oraline Paste	−	±	±	−	±	±	−	+	±	−	+	±	−	+	±	−	+	+	−	+	+	±	+	+	±	+	+	±	+	+
Pasteurine Tooth Paste	±	+	+	±	+	+	±	+	+	±	+	+	±	+	+	+	+1	+	+	+1	+	+1	+2	+2	+2	+3	+3	+2	+3	+3
Euthymol Tooth Paste..	±	+	+	±	+	+	±	+	+	±	+	+	±	+	+	+	+1	+1	+1	+2	+2	+2	+3	+3	+3	+4	+4	+3	+4	+4
Woodbury's Dent. Cream	−	±	±	−	±	±	−	±	±	−	±	±	−	±	±	−	±	±	±	+	+	+	+1	+1	+	+1	+1	+	+1	+1
Oriental Tooth Paste ..	±	+	+	±	+	+	±	+	+	±	+	+	±	+	+	+	+1	+	+1	+2	+2	+2	+3	+3	+3	+4	+4	+4	+5	+5
Pâte Dentifrice (R.&G.)	+	+1	+1	+	+1	+1	+	+1	+1	+	+1	+1	+1	+2	+1	+1	+2	+1	+2	+3	+3	+3	+4	+4	+4	+5	+5	+4	+5	+5
Arnica Tooth Soap	−	±	±	−	+	+	−	+	+	±	+	+	±	+	+	+	+1	+	+1	+2	+2	+1	+3	+3	+2	+3	+3	+2	+4	+4
Lister's Tooth Soap	−	±	±	−	+	±	−	+	±	−	+	±	−	+	±	−	+	+	−	+1	+1	±	+2	+1	±	+2	+1	±	+2	+2
Beauty Tooth Soap	−	+	+	−	+	+	−	+	+	−	+	+	−	+	+	±	+1	+	+	+2	+1	+	+2	+2	+1	+2	+2	+2	+3	+3
Fragrant Tooth Powder	−	+	+	−	+	+	−	+	+	±	+	+	±	+	+	+	+1	+1	+	+2	+1	+1	+2	+2	+2	+3	+3	+3	+4	+4
Banzai (Powder)	±	+	+	±	+	+	+	+	+	+	+1	+1	+	+1	+1	+	+2	+1	+	+2	+2	+1	+3	+3	+3	+5	+5	+4	+5	+5

KEY TO SIGNS: − no result. ± very slight. + slight. +1 medium. +2 marked. +3 well marked. +4 very marked. +5 excessive.
E, enamel. D, dentin. C, cementum.

tion of the pulp the stain will frequently permeate from within throughout the substance of the dentin, and, reaching the enamel cap, will permeate that tissue and stain it through and through.

In order to prove that the enamel itself was stained, and that the discoloration was not simply due to an array of colors in the underlying dentin, I examined freshly extracted teeth with perfect enamel caps, or as nearly perfect as nature usually makes them, in which the pulps had lost their vitality, and which were badly discolored through the process of putrefactive pulp decomposition. After amputating the crown with a saw, I drilled out all the crown portion of the dentin, leaving the enamel intact, and found the discoloration still present in the enamel tissue.

Stains do not penetrate the enamel as quickly as the other tooth tissues, on account of its greater density, its histological structure not presenting the avenues of entrance that are found in dentin, cementum, and bone. In addition to this, the enamel is largely composed of inorganic matter for which many coloring agents have very little chemical affinity. Nevertheless these stains do attack the enamel, as has already been proved in my laboratory experiments made out of the mouth; besides which, the experiments just mentioned prove that enamel is susceptible to the penetration of stains in the mouth.

Tobacco stains. In the instance just mentioned the enamel was dead enamel, offering no vital resistance against the entrance of the stain. But vital enamel will take stains, as evidenced in the case of tobacco-chewers. Who has not seen deep staining of enamel caps in these cases? I have made sections of enamel stained with tobacco, and have found it deeply discolored. Again, I have observed cases in which, after patients had chewed tobacco for years, with the resultant staining, on discontinuance of the habit and institution of strict oral hygienic conditions with regular brushing of the teeth, gradually the stains would almost disappear, though not entirely, from vital teeth, while they remained (to a large extent permanently) on any teeth which had lost their vitality.

D. D. Smith(1) claims that the color of teeth becomes lighter and more brilliant from the constant burnishing incident to his methods of oral prophylaxis, and believes this to be due to the stimulation of some sort of modified circulatory apparatus, the function of which enables the tooth to absorb as well as throw off stains present in its substance. This would certainly appear to be the case in the instance of the tobacco stains just mentioned, and would account for the accumulation and disappearance of other transient stains occasionally found.

If stains can be carried throughout the substance of a tooth by absorption from the inside, as is seen in putrefactive processes originating in the pulp, there is no valid reason why they cannot as well be carried inward from the outside. In fact we have abundant proof of this, as evidenced in the case of tobacco-chewers already mentioned, as well as in other instances of the same phenomenon. C. H. Land has mentioned the fact that persons who constantly chew cloves have their teeth stained throughout with a brown color. Burchard(2) and other writers, some of whom have already been cited, have called attention to the fact that deep staining of the enamel and other tooth tissues may be produced from without or from within by such agents as copper, brass, iron, mercury, silver, nickel, etc. The staining of enamel by chewing the betel-nut, as already cited, offers additional proof.

Metallic stains. A case of green stain in the mouth of a patient who works in a brass foundry, and who came under my observation some weeks ago, revealed the fact that vital enamel will absorb copper stain. A vital tooth, much misplaced in the arch, and with perfect enamel cap, was extracted and dissected transversely in the center of the crown, when it was noticed that a slight greenish tinge was present in both enamel and dentin, after the tooth had been thoroughly cleaned.

Thus it is proved that macroscopically

apparently perfect enamel caps will transmit stains originating either from without or within, throughout their substance. But very few perfect enamel caps are found in any mouth. Extraneous stains in the majority of instances find an excellent gateway of entrance through roughened enamel surfaces, cracks in the enamel, abraded and eroded surfaces, cavities of decay, exposed cemental surfaces at the necks of teeth, and pits and fissures, where frequently an imperfect coalescence of enamel plates exists.

If these tissues, then, will discolor in the mouth from the causes already mentioned, there is no valid reason why they should not take practically any staining agent brought constantly in contact with them.

Food stains. Foods, during the act of mastication, are being brought daily into contact with exposed or practically exposed dentinal and cemental surfaces. Many of these foods are naturally colored, while others are artificially colored by the manufacturers. In addition, in unclean mouths, the processes of fermentative and putrefactive decomposition are constantly in progress, with the consequent production of sulfids, oxids, and other salts which have a tendency to discolor the dental tissues.

Senile teeth are of a darker hue than the teeth in adolescence. This is believed to be due to an increase in density of the teeth with age: James Truman([1]). It is also, in my opinion, due to the absorption of extraneous coloring matters with which these teeth are daily coming in contact, as well as the deposition of pigmentary matters from within, by way of the pulp.

Staining agents in the mouth produce a change in the color of a tooth in two ways, depending upon their solubility or insolubility. Solutions stain the cementing substance uniting the tubules, while insoluble colors enter the tubules and remain, preventing the transmission of light, and thus darkening the tooth structure: Buckley([4]).

CORROBORATIVE EVIDENCE OF DISCOLORATION OF DENTAL TISSUES FROM COLORED DENTIFRICES.

As evidence of the staining properties of colored dentifrices I wish to present the following facts which have come under my observation during the time that I have been investigating this subject. I expect before the next meeting of this association to be able to present for the consideration of the dental profession a much more extended report of clinical evidence bearing out my laboratory experiments and the few oral tests which have been completed up to this time. With reference to the oral tests, I must confess that the color question is so unmeasurable, so intangible, that I have been at some loss to devise means or methods of experimentally producing and detecting discoloration in the mouth. An entire denture may be changed in color to quite an extent without the change being apparent to anyone but a very close observer, as would happen by the use of a colored mouth-wash for instance, because all the teeth are subject to the action of the agent at the same time; whereas, if only one or two teeth are discolored from some cause, the change is much more noticeable.

(1) Dr. H. T. Smith of Cincinnati has had numerous patients complain that a well-known wash, which he had been prescribing, produced discoloration of their teeth. He has been compelled to abandon this preparation on that account.

(2) Dr. H. E. Friesell of Pittsburgh, in a private communication, informs me that he has noticed discoloration of cementum, when it was exposed, from colored tooth preparations.

(3) Dr. C. M. Wright of Cincinnati has been in the habit of prescribing a popular colored mouth-wash, but was forced to abandon it on account of a number of patients complaining that it was discoloring their teeth.

(4) Dr. Flora N. Haag of Cincinnati has noticed discoloration of tooth structure in the mouths of her patients from

the use of a well-known colored dentifrice.

(5) As mentioned earlier in this paper, I have had many complaints on the same score from patients, some of them extending back for quite a number of years. The following case is significant:

(6) Mrs. H. K. F., formerly a patient in my private practice, was prescribed the frequent use of a markedly colored proprietary mouth-wash during the treatment of the pyorrhea alveolaris from which she was suffering. The day before she left for England, where she was to make an extended visit, she was told to use the preparation five or six times a day until her return, when she was to consult me again. On her return several months afterward she informed me that she had been compelled to abandon the preparation on the advice of an English dentist, whom she had consulted abroad, because she found that it was causing her teeth to turn dark.

(7) Mr. J. B. H., on examination of his mouth, exhibited a greenish brown stain affecting most of his teeth; the stain was especially apparent on the gingival two-thirds of the crowns. He did not use a tooth-brush, powder, paste, or soap, but occasionally rubbed his teeth with a soft cloth. He also rinsed his mouth daily with a colored mouth-wash, because he was told that it would keep the tartar from accumulating so rapidly. His teeth were thoroughly scaled and polished by means of brush wheels and pumice mixed with hydrogen dioxid, but it was impossible to remove all of the stain at his last visit.

EXPERIMENTS IN STAINING TEETH IN THE MOUTH.

Transient staining of enamel surfaces in the mouth has been produced by means of the following experiments conducted during the past few weeks.

No. 1. A gold cap, into the distal side of which was soldered a metal tube, was made to fit loosely over a perfect upper left lateral incisor in my own mouth. This could be worn with a fair degree of comfort owing to the character of the occlusion. The cap was placed in position, being sealed at the gnigival border with gutta-percha. Twice daily a colored mouth-wash was injected through the tubular opening, the orifice of which was then sealed with gutta-percha. The experiment was abandoned after several days' trial, because it was found that leakage was occurring at the gum line, and it was impossible to keep the wash in constant contact with the tooth. The results, thus, were negative.

No. 2. Another cap was made for the same tooth, without the tubular opening, and was several times a day filled with a colored tooth paste; the cap was occasionally removed to moisten the paste and to ascertain that it was remaining in contact with the tooth. This cap was worn at frequent intervals for a week. After the cap had been removed and the tooth thoroughly brushed, at the end of fourteen hours, a slight discoloration of the entire enamel cap was observed. This stain disappeared at the end of two or three hours on leaving off the cap, but was apparent again after replacing the cap and keeping the paste in contact with the tooth till the following day. Three colored pastes were experimented with, two of which produced staining, the other not having any apparent effect. I found that I could produce slight superficial staining of the enamel at will with these two preparations, the stain in each instance disappearing gradually at the end of two or three hours on leaving off the cap. The results, thus, were positive.

No. 3. The teeth on one side of the mouth were brushed for a period of fifteen minutes at a time, eight times a day for two days, with a colored tooth paste of English manufacture, an effort being made to keep the paste away from the opposite side by tilting the head toward the side that was being brushed. At the end of this time the soft tissues of the mouth and lips presented the appearance of having been rouged, they being markedly stained by the preparation used. All the teeth on one side of the mouth presented a slight pinkish tinge—this gradually disappearing after the experiment was abandoned, which was done on account of soreness of the gums incident to the continual brushing and the danger of producing permanent injury. The results, thus, were positive.

CONCLUSIONS.

(1) That extracted teeth are susceptible to staining by practically all of the

coloring agents or dyes which are being used by the manufacturers for coloring dentifrices has been proved by my laboratory experiments.

(2) Staining of enamel, dentin, and cementum has been produced in the laboratory experiments on extracted teeth with a majority of the artificially colored dentifrices on the American market.

(3) Staining of these tissues has also been produced in the laboratory by several colored dentifrices which are not artificially colored, but which owe their color to one or more ingredients which possess color.

(4) These stains are penetrating stains, which are practically unaffected by sunlight or continued washing.

(5) Vital teeth in the mouth are responsive to staining by colored tooth pastes, as has been proved by experimentation in the mouth.

(6) In numerous instances patients have complained of the discoloring properties of some of the colored proprietary dentifrices.

(7) In the clinical cases presented, the history and every other feature lead to the inference that the stains were undoubtedly produced by colored dentifrices.

(8) Stains formed by putrefactive decomposition of the pulp will penetrate *from within outward,* and produce discoloration of the entire enamel cap, as proved by the experiments already mentioned.

(9) Stains from nickel, lead, copper, brass, silver, mercuric chlorid, potassium permanganate, oil of cassia, oil of cloves, and other similar agents will produce discoloration when acting from within *or on the outer surface* of a tooth, these agents staining enamel, dentin, or cementum, as has been mentioned by various authorities.

(10) Copper stain has been proved to be penetrating—having, in the case mentioned, penetrated enamel and dentin.

(11) Enamel, dentin, and cementum, as is well known, readily take stains from tobacco, cloves, and the betel-nut, the tobacco stain being a deeply penetrating stain, as has been proved.

(12) Non-vital teeth stain much more readily than vital teeth, and non-vital teeth are frequently found in the mouths of patients.

(13) Vital or non-vital dentin and cementum, whenever exposed, readily *take almost any stain with which they come in contact,* as they are found discolored in practically every instance in which they have been exposed for any length of time.

(14) Cracks in the enamel, abraded and eroded surfaces, cavities of decay, and other similar conditions already mentioned, offer excellent avenues of entrance for stains of every character.

(15) Teeth darken with age, and as they will be discolored both in the mouth and out of the mouth by any one from the large list of agents that have been mentioned, there is no valid reason why they will not, in time, absorb practically any colored pigment, *including colored dentifrices* with which they are constantly brought in contact. This being the case, there is a strong possibility of this cause being largely responsible for the darkening of the teeth with age.

Considering the clinical evidence adduced, the laboratory and oral experiments performed, and the seemingly altogether reasonable deductions made, I am forced to the logical conclusion that—

Colored dentifrices constantly used in the mouth will produce staining of tooth structure, and for that reason should be abandoned in favor of colorless preparations.

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PLAQUES.

By THEO. B. VON BEUST, D.D.S., M.D., Dresden, Germany.

IN the DENTAL COSMOS for November 1911 (vol. liii, p. 1269) we find an article written by Dr. F. W. Low on the "Prophylactic Value of Potassium Sulfocyanate in Saliva." In Dr. Low's opening remarks upon terminology we read: "*Plaque,* any patch or flat area. *Microbic* or *gelatinoid plaque* (Black), a patch or flat area found on the human tooth, differing from zoöglea in that it is a product evolved by the lactic acid bacteria instead of being a jelly-like matrix holding together a mixed or conglomerate mass of various microbic forms, plaques also being much more tenacious in their attachment to enamel surfaces than are zoöglea, and differing in other essential characteristics."

There are some observations in this connection which I beg to offer. It appears to me that the alleged difference between a plaque and a zoöglea, as applied to the specified deposit upon the teeth, is devoid of any scientific support. Plaques over areas of incipient caries were observed and commented upon as early as 1847, probably earlier. Ficinus expressed the belief that these plaques consisted of Bühlmann's fibers (syn., *Leptothrix buccalis* Robin, *Bacillus max. buc., Leptothrix innom.* Miller). Klencke states that the organisms seen by Ficinus are in some cases present; in others, however, the plaque consists of organisms which he terms *Protococcus dentalis.*

Leber and Rottenstein (1867) confirm the observations of Ficinus, and find that the leptothrix elements in tooth slime are responsible for the conglomeration over the commencing decay. These authors declare, further, that the dental cuticula can be loosened by means of acids, so that it can be removed *in toto.* Upon examination of the loosened membrane it will be found to be thickened at the point where it lay in contact with the carious surface, and they furthermore declare the thickening to be the result of an accumulation of leptothrix elements.

Many years after that we find these statements (so far as the existence of the plaque is concerned) substantiated by Black, Williams, and Miller.

Black goes farther, and says, in reference to the plaque: "I do not mean accumulations of micro-organisms loosely held together on the surface of the tooth, inspissated mucus on the tooth, greasy accumulations on the tooth, or any of those things; I mean a substance that is gelatinoid, or gelatin-like, but not gelatin. Not soluble or meltable as gelatin, but which has the appearance of the latter."

Gelatinoid, or gelatin-like, but not gelatin! What is it? Is it a carbohydrate, a proteid, or a glyco-proteid? Is this plaque a colony (zoöglea) or is it not? Dr. Low says it is not a colony! If it is of microbic origin, then what is it? and how does it differ from a colony? What are the "other essential characteristics" of differentiation? Verily, the methods of microscopic technique and microchemical analysis have reached a degree of perfection quite sufficient to enable the student of the plaque to tell us something definite about its chemical and physical characteristics. To *the plaques upon the teeth,* however, we must look for such data—not to artificial products.

Another point in regard to the gelatinous substance. Dr. Low states that it is "a product of lactic acid bacteria, instead of a jelly-like matrix." If such be the case, then we would like to hear how it differs from the jelly in a *real zoöglea?* If the tenacity of the jelly of the real *microbic plaque* (Black) supposedly formed by the lactic acid germs is to be advanced as proof, then how are we to bring the following fact into conformity with Dr. Low's conclusions: Some of the most notorious acid producers of the *Bac. acidi lactici* group have delicate or *slimy* colonies!

Sections through the plaques found in nature, variously hardened, mounted, and stained, coupled with careful microchemical analysis, can alone lead to a correct conception of the accumulation now known as the plaque of caries. So long as our knowledge of the *real* plaque is so deficient, culture experiments will remain useless. It seems to the writer that the gentlemen referred to are trying to demonstrate a *something*—supposedly resembling "a small rounded glistening body, about 1/32 inch in diameter"—the constituency of which is unknown, by means of agents equally unknown.

CORRESPONDENCE.

THE INFLUENCE OF *KCNS* ON THE DENTAL PLAQUE.

To the Editor of the Dental Cosmos:

Sir,—I have read with deep interest the paper of Dr. F. W. Low, entitled "Prophylactic Value of KCNS in Saliva," with its discussion, as reported in the November 1911 Cosmos, and also your editorial comments thereon.

If one who can make no pretensions to fame as an original investigator may be permitted to offer comment on the subject, the present writer would express his belief that it is of relatively minor importance whether the plaques are "gelatinoid," as Dr. Black is quoted as claiming, or truly gelatin, as it appears that you assume the Research Committee to suppose; the vital question would appear to be whether KCNS has a solvent or restraining effect upon it or not. Clinical observation leads the present writer to believe that it does tend to restrain the growth, not only of the plaques of Black, but also deposits of a slimy nature generally. Its use seems to tend to make the mouth more self-cleansing.

Although the writer has neither the facilities nor the special training necessary for exhaustive research work, he has long held the belief that while the teeth are not vascular so far as their hard tissues are concerned, yet it seems probable that they partake of the properties of the living fluids in which they are immersed—possibly in some way allied to, if not actually the same as osmosis. This opinion would seem to be borne out by the recent investigations of Boedecker, as reported in the Cosmos for September 1911, although he does not go so far, apparently, as to consider osmotic action.

If the above premise be allowed to stand, then it would seem proper to seek the source of immunity to caries, or the lack of it, in the vital fluids of the body, just as we would in the case of immunity or otherwise against other diseases.

A study of the investigations of Sajous, Lorand, and others leads the writer to believe that these conditions of the saliva and other fluids surrounding the teeth may be influenced by the secretions from the ductless glands. There certainly can be no doubt that the state of general health may have a relation to the health of the teeth.

If our present knowledge of biochemistry is inadequate to determine just what elements the secretions of the mouth may possess which enable them to inhibit the activity of pathogenic organisms, the question whether they do possess such elements may be settled by transplanting a tooth from an immune into the alveolus of a susceptible, and *vice versa.* This ought not to prove difficult, and certainly would be a more practical test than to study salivas diluted with water or to make cultures in "lamb juice."

If the above ideas are sound enough to obtain a hearing, is it not possible that someone capable of making accurate studies may see fit to prove their truth or fallacy?

Yours very truly,
L. H. Wirt, D.D.S.

Bombay, India, December 7, 1911.

PROCEEDINGS OF SOCIETIES.

NATIONAL DENTAL ASSOCIATION.

Fifteenth Annual Meeting, held at Cleveland, Ohio, July 25-28, 1911.

SECTION III: Oral Surgery, Anatomy, Physiology, Histology, Pathology, Etiology, Hygiene, Prophylaxis, Materia Medica, and Allied Subjects.

Chairman—WM. CARR, New York, N. Y.
Vice-chairman—RICHARD SUMMA, St. Louis, Mo.
Secretary—L. P. DOTTERER, Charleston, S. C.

(Continued from page 216.)

THURSDAY—*Second Session.*

The second session of Section III was called to order on Thursday evening at 8.30 o'clock, by the vice-chairman, Dr. Richard Summa, St. Louis.

Dr. SUMMA. Before we begin with the regular program, I wish to say this: At a previous meeting of the section Dr. McCauley read a paper along the lines of the investigations of Dr. Black. Now, since Dr. Black published his investigations, all dentists have wondered what amalgam they should use. Dr. McCauley also stopped short of that, and a challenge was made to him to make investigations of the different amalgams and give us their names. Dr. McCauley accepted the challenge, and wishes a year's time to make the investigations. In order to do this work he asks that you send him samples of the amalgams you are using, and write upon the envelope the name of the amalgam and the date on which you send it. He will then make tests of the amalgams, and in a year's time report the results; he will give the names of the amalgams, and will not hesitate to make public his findings, and will be honest about it. In order to give this movement a little backbone, I have deemed it best to appoint a committee to take charge of this work. The chair appoints as such committee Dr. C. M. McCauley, Abilene, Texas, chairman, Dr. C. E. Woodbury, Council Bluffs, Iowa, and Dr. G. W. Dittmar, Chicago, Ill.

The Vice-chairman then announced as the first order of business for the evening session the reading of a paper by Dr. G. H. WRIGHT, Boston, Mass., entitled "(I.) A Group of Deformities of the Nasal Respiratory Tract, Coincident with Dental Irregularities. (II.) A New Instrument for Comparative Measurements, Demonstrating Changes in Nasal Fossæ when Readjusting the Maxillary Arch."

[This paper is printed in full at page 261 of the present issue of the COSMOS.]

Discussion.

Dr. A. COOLIDGE, Boston, Mass. From the point of view of the laryngologist, this subject is most important. Obstruction to nasal breathing is one of the most common symptoms for which his advice is sought, and he soon learns that some cases are as difficult to understand and treat as others are easy. The most difficult cases are those in which there are no obvious obstructions, such as adenoids or some inflammatory irritation or deviating septum, but in which the nasal cavities, more especially their anterior portions, are abnormally narrow, leaving insufficient room for the normal play of the constantly changing turbinated bodies. He learns by repeated observation that it is breadth and not height of a nasal cavity which favors easy breathing. A relatively large growth of the septum, as is frequently seen in the leptoprosopic skull of Siebenmann, associated with a high palatal arch, appears to favor nasal obstruction, while the relatively small septum, as an example of which we may take the negro, tends to be associated with broad cavities, a more normal arch, and more patent nostrils. It is the same class of cases, those with narrow arch and narrow nasal cavities, which present problems both to the dentist and the rhinologist. I will not go into the subject of the etiology of the bony development in these cases, except to say that it is still under controversy, and that there are evidently several factors to be considered. Of these the development of the premaxilla, which, as it bears the incisors, must necessarily readjust itself to its environment at the time of the second dentition, has undoubtedly a large influence. The reason why a narrow nose is not so good an organ as a broad one, even when its height is greater, is, as I have said, because there is too little room for the normal function of the turbinated bodies, especially the lower. In a high cavity the turbinates are long, in a narrow one they are necessarily nearer the septum. The turbinates have a wonderful power of adjusting themselves to fit the spaces which they occupy, and will often overcome by this adjustment what would otherwise be a pathological deviation of the septum, but they find more difficulty in carrying on their proper functions without sufficient space between themselves and the septum. The symptoms which we expect to find from nasal cavities which are normal in every way except in breadth are therefore what might be described as functional disturbances of the turbinates, and of these the one which the patient will probably notice is a periodic difficulty in getting as much air through his nose as he would like to. All nasal cavities become periodically narrowed by inflammations, such as a cold in the head, by nervous disturbances, or even by posture, as in lying down at night, but those in which the natural play of the turbinates is restricted will suffer the most.

How does the rhinologist try to correct these symptoms? If there is no other cause for obstruction, he must attack the turbinates, which in themselves are entirely normal and functionating organs. Sometimes by applications or cautery he may give them a hint, as it were, that their erections should be more restrained, but if this is not enough, he must reduce their size. A little reduction of tissue may give the desired result. But a better way, if he could accomplish it, would be to give them more room.

This I hope is a brief explanation of the great help that the dentist will give to us if he can carry the naso-antral walls, and with them the lower turbinates, away from the septum. Why or how a force applied to the teeth or even to the alveolar processes does this, I will not take up. They are both parts of the same bony structure; if the alveolar processes can be moved outward, I suppose the external nasal walls have to go with them. The important fact is that it can be and has been done.

Dr. **Fred C. Cobb**, Boston, Mass. Dr. Wright asked me to say a few words with regard to the influence of nasal deformities from a bacteriological standpoint. The experiences in bacteriology of the nose that we have had lately have been extremely interesting. The nose is a very strong sifter of bacteria. For years it was noted, after septal and other operations in the nose, that the wounds healed remarkably well, and the natural conclusion was that the nose was sterile from a clinical standpoint. Yet, from cultures made by many excellent investigators, the nose was found to contain bacteria, and it was impossible to introduce instruments inside the nose without introducing bacteria. Some English investigators finally decided that there were bacteria on the hairs of the nose. On disinfecting the hairs they found that in about 80 per cent. of cases sterility of the nose could be effected. Dr. Inglis and I have disinfected the hairs in the nose in all sorts of ways and with all sorts of agents, and we have finally succeeded in obtaining sterility of the interior of the nose in 95 per cent., after the hairs have been properly disinfected. As corollary it is very interesting to note the effects of the constant presence of all sorts of bacteria, streptococcus, staphylococcus, etc., in the nose, some of which with every breath are drawn from the hairs into the nose. French scientists have been experimenting with the nasal fluids and have found that they are not antiseptic. These fluids were withdrawn and examined under artificial conditions. If bacteria are introduced in the nose, they do not grow; the fluids of the nose, therefore, must be antiseptic, and the hairs serve as strainers to prevent an excess of bacteria from being introduced. The hairs of the nose and the constantly exudated fluids kill bacteria and render them inert. As an example, I have drawn perfectly pure Klebs and Loeffler cultures of diphtheria, which were confirmed by the Harvard Medical School, from the hairs of a woman's nose who had applied for treatment of nasal catarrh. She had no diphtheritic membrane in her nose, and no thermic or any other symptoms of the disease. She was watched for some time, yet she failed to exhibit the least symptom of diphtheria. These Klebs and Loeffler bacilli must have been arrested by the hairs of the nose and killed by the nasal secretions. If the nose is blocked, this function of the nasal secretions is obliterated, and although the oral secretions may to some extent neutralize bacteria, there is little question that they do not neutralize them as perfectly as do the nasal secretions. Dr. Wright therefore has rendered us an important service by demonstrating how to widen the nose.

In this connection I am forcibly impressed with both the great advantage and the great disadvantage of specialization. In the nose and throat clinic of the Massachusetts General Hospital we have for years generalized upon the shape of the nose; we considered that adenoids alone were responsible for nasal obstructions, and that deviations of the septum had a great effect on the nose. Now another specialist presents his specialty, combines it with ours, and shows us another point. In other words, the specialist ought not to rely on himself and his own particular specialty, but should always realize that there are a great many other specialists who could help him remedy his own defects and improve his work. One of the great shortcomings of medicine has been that we have not relied enough upon each other, that we have occupied ourselves too much with one organ, instead of duly considering the neighboring organs.

Dr. Edwin C. McDowell, Harvard Univ. To one interested in heredity two questions are suggested by Dr. Wright's paper, these being: Are such abnormalities of the teeth inherited, and if they are inherited, will the cure be inherited, after the abnormality has been corrected in the way Dr. Wright has shown? I shall take up the first question, and in regard to the second give a perhaps brief suggestion.

Numerous statements have been made that defects in the teeth are inherited. There seems good reason for believing that this is true, since there are a great many data showing that inheritance in general is a definite factor.

I may cite two classes of well-defined examples. One of these is the abnormalities of the feet and hands, cases of syndactylism where fingers or toes have grown together, this union of fingers or of toes having been passed down from generation to generation in perfectly orderly succession. Another example of this class is brachydactylism, in which, instead of having three joints, all the fingers are thumbs, two bones having become joined. This has been well shown. The cloven foot, a more advanced stage of syndactylism, in which the foot is divided and there is one great claw on each side, is a horrible deformity, which occurs regularly generation after generation.

A second class of abnormalities is irregularities of the eye. Cataract, color-blindness, night-blindness, irregularities of the retina, total or partial absence of the retina—all these I would cite as cases of inheritance, and it would seem likely that such conditions as Dr. Wright has described are inherited. In my opinion dentists have a very remarkable opportunity to find out whether such conditions may be inherited.

In animals, inheritance has been studied with great facility. In man, of course, intermarriage renders the study of inheritance very difficult, while in experimental breeding this difficulty may be overcome. There are many cases of heredity in animals, also in plants. These have been studied, and besides the mere fact of inheritance of certain characteristics, laws have been found which will enable one to predict in certain cases what the result of certain matings will be. I wish to give you briefly an idea of the main law that has been established by experimental breeding. In animals, the color and the quality of the hair; in plants, the various sizes, the very many minute irregularities in seeds and pods and other seemingly unimportant details—have been most exhaustively studied. In animals the number of abnormalities is not great, and the color of the hair offers an easy index for the student of heredity to start with.

I shall cite one case to illustrate Mendel's law, upon which all the more advanced experimental work in heredity is based at present. The fact of the inheritance of color may be shown in animals when a special variety of guinea-pigs, for example, breeds true. Black guinea-pigs, if of a regular stock, will always breed black, and will always be black no matter how long they are bred. A white guinea-pig, if of a pure race, will always produce white offspring when bred with other white ones. If a black and a white guinea-pig are mated, the offspring will invariably be black. This is the first part of the Mendelian law. The black dominates the white; the white recedes before the black, the black is the dominating, the white the recessive. It should be borne in mind that the animals used for those experiments must be of pure stock—the black guinea-pig must have come from black ancestors, the white guinea-pig from white ancestors.

If black guinea-pigs are inbred, we shall find some white guinea-pigs, one in every four being white. The facts that the white do not mix with the black, and that white guinea-pigs will appear in the second generation—*i.e.* entirely white, not gray or spotted with black—is the second part of the Mendelian law, namely, segregation.

The third point in this law is the fact that one in four in every litter of pigs is white, in a perfectly fixed proportion. If there are three pigs in a litter, they may all be black; if five, four may be black and one white, but in the long run this Mendelian ratio will always be maintained. Many complications of this law have been found to exist, and indeed this simple ratio is only found to exist in just such cases as I have described, with such a strong characteristic existing in the race, as in a white and a black guinea-pig.

I cannot pretend to go into an elaborate explanation of the cytology and of the mechanism by which this phenomenon may be explained, but may merely say that discoveries in the biological field have substantiated this law to such an extent that it has become the foundation of all the experimental work in regard to heredity.

It seems perfectly natural, indeed very likely, that these laws apply to man, as they also apply to plants of certain colors. Until the last two years it has been greatly doubted, and not proved, that the Mendelian law may apply to man. The scientist has been ready to accept such a statement if it could be proved. Public opinion, of course, was very averse thereto; the idea of man being subject to the same laws as the lower animals is unpleasant to many people. But from investigations that have been published since 1907, it seems that Mendel's law applies to man as well as to the animals, in regard to such characteristics as the color of the hair, eyes, and skin. We owe the most important investigation to Prof. Chas. B. Davenport, who was formerly associated with the Cytological Society of Cambridge, and is now director of the Brooklyn Institute biological laboratory at Cold Spring Harbor. Through his work and efforts, data have been gathered from the study of which it has been shown very clearly that Mendel's law will apply to man. I cannot go into details further than saying in regard to the color of the eye that the black or dark eye is the dominant. If a representative of a race that has never had blue eyes were mated with an individual with blue eyes, the offspring would have dark eyes. In other words, blue eyes act as a recessive, while dark eyes dominate.

In man of course these conditions cannot be followed easily. The most careful and intricate labor is required, and after that has been done, opponents will question the validity of the data itself, and so it will probably be several years before the statements that I have made will be more generally accepted. Yet I believe that the most advanced investigators believe that Mendel's law applies to man also.

Here is an opportunity for the dentist to do a little research work. The greatest difficulty in collecting data for man lies in the lack of color. As to determining characteristics according to Mendel's law, a most exact method for determining abnormalities has been offered by Dr. Wright. By collecting such abnormalities in order to determine whether any of them are inherited, we may eventually be able to conclude from the corroborative evidence collected by dentists and students of heredity that such abnormalities come under Mendel's law.

I come to the second question: When such an abnormality is purely individual, will this individual have normal children? The cure of such an abnormality, provided it has been inherited, would be a complete one. It would come in the same category as any injury of the body, although popularly, for a long time and until very recently even among scientists, inheritance of acquired characteristics has been believed to be a fact. Many observations and cases studied have induced scientists to change their opinion. I should like to cite one interesting case which lends weight to the belief that acquired characteristics are not inherited.

A white guinea-pig was castrated, and the ovaries were transplanted from a black guinea-pig which came of pure black stock. The white guinea-pig had been tested before, and had produced only pure white offspring when mated with a white male. The ovaries of the black guinea-pig in the white guinea-pig grew, and the pig was mated with the same white male with which it had been previously mated. Four young guinea-pigs were obtained, and all were pure black. If there was any inheritance of acquired characteristics, if the tissues of the white guinea-pig could influence the germ cells within it during pregnancy or before—incidentally it should be mentioned that the transplanted ovaries were very immature, the black guinea-pig from which they were taken being perhaps two or three months old, so that no ova had been formed as yet—in this case some difference would have been expected. In this case two white guinea-pigs produced black offspring, the white guinea-pig not being able to affect the cells within her own body. This very recent experiment is considered to have great weight in reference to the question of acquired characteristics. If such abnormalities as Dr. Wright has described are inherited, there is great doubt whether the offspring of the patient in whom these abnormalities are corrected will be normal.

Dr. G. V. I. Brown, Milwaukee, Wis. We have been seeking an instrument which could be depended upon for accuracy in intranasal measurements. Dr. Lea W. Dean of Iowa City devised one that has served this purpose quite well, and it is with this instrument that the measurements which I have reported were made. Until I saw Dr. Wright's instrument, I had not thought it possible to make one so perfectly accurate as his.

It is a gratification to me to hear a paper upon this subject, based upon such a complete theoretical foundation as the essayist has laid, because it is now about ten years since the first paper which I prepared on the separation and readjustment of the maxillæ for the purpose of widening the nares was read before this association. Since then some scientists have made very positive statements that this could not be done. With the evidence that Dr. Wright has adduced, it is impossible to deny any longer that the nares can be widened by expanding the upper arch in such manner as to spread the maxillary bones. I have proved this by taking green skulls and showing a wide separation through the median suture, which we know does not close until well toward middle life. I put the limit at thirty years of age, but I think Dr. Wright has gone beyond this, even to sixty years.

Dr. WRIGHT. Over fifty years.

Dr. BROWN. Up to thirty years of age, in the average individual, it is fairly safe to undertake the separation of the maxillary bones in from ten days to two weeks, and to produce promptly an increase in the size of the nares. A more effective nasal improvement is thus secured than one unfamiliar with such treatment would expect, and the results have been confirmed by actual measurements.

It occurred to me some time ago that if we can correct, as we believe we do, deviated nasal septa and contracted nares by spreading the arches, by inhibiting the growth of the upper dental arch so as to prevent it from growing wide across the palate, we ought to be able to produce these defects. I therefore took a litter of pups eight weeks old, and with a wire passed above the palate across the floor of the nose, and attached to silver plates held at each side against the maxillary bones in the malar region, made slight compression. Not as much force was applied as would be necessary to reduce a cleft palate, but just enough to make the relation of the noses of these dogs in the region of the bicuspids the same as that in children whose upper bicuspids are slightly in lingual occlusion; in other words, to place the dogs' teeth identically in the situation in which we find them in approximately ninety per cent. of the children who require orthodontic treatment. When these pups were six months old, estimating that this would approximately represent the age equivalent to six years in man, they were killed, and sections of their jaws were made. I present [exhibiting] illustrations of sections of the head of the control pup that was not operated upon, but was given the same food and care as the experimental pups, and similar sections of the heads of those pups that were operated upon as described. If you examine these illustrations, you will find that at the point where only slight compression was made (other results depending entirely on preventing a growth across the upper dental arch) the nose is almost completely obscured, the nasal septum is markedly deviated, and there is a very much enlarged maxillary sinus. These experimental pups were exceedingly nervous, thin, and emaciated, although they were provided with the same food as the control pup. The control pup grew very well, while the others did not.

Dr. WRIGHT (closing the discussion). There is very little more that I wish to add, excepting perhaps that I should hesitate quite seriously to attempt to open the palatine suture or any suture in a young and growing child in the short period of two or three weeks, or even two or three months. I am inclined to be more conservative. My experience to date has convinced me that it is better to proceed slowly in the application of force in opening these sutures. In cases in which the force has been misapplied, the patient has encountered troubles in the region of the floor of the orbit, and some other tissues. In my opinion, it is best to copy as nearly as possible the orderly growth of nature. If we keep close to what we call normal physiological limits, we shall not go far astray. I think, however, Dr. Brown is justified in opening the suture in the palate in order to give relief for intranasal breathing as soon as possible. This is what I have been pleased to call the unearned increment of maxillary expansion. If we apply a little force to get that result, and this constantly applied force begins to act more quickly than normal growth, and nature adjusts the parts and produces normal growth, we obtain what I call the unearned increment, *i.e.* we have set the forces of nature to work to bring about the desired result.

I am obliged to you for your sympathetic interest. If the result which I have described to you will help to impress you with the fact that these sutures can be opened and that these bones can be moved by a simple means, we have made a forward step in the advancement of this important subject.

The next order of business was the reading of a paper by Dr. A. C. Fones, Bridgeport, Conn., entitled "The Necessity for and Training of a Prophylactic Assistant."

[This paper is printed in full at page 284 of the present issue of the Cosmos.]

Discussion.

Dr. C. M. Wright, Cincinnati, Ohio. When a man has given his mind to the consideration of one subject for a number of years, it is a special delight to him to find another who not only fully appreciates the importance of that subject, but can present it in such a clear and logical manner that all must accept it as a truth. For years I have urged this point in regard to prophylaxis, that dentists do not and will not perform the necessary fundamental prophylactic operation of treating *healthy* teeth and gums. They will not grasp the idea clearly that preventive surgery of the mouth, which consists of cleaning and polishing all surfaces of the teeth, must be considered essential in practice, before the ever-present factors of disease can get a foothold. When we remember that the dental profession deals with less than half a dozen varieties of pathological conditions, and that but two diseases, viz, caries of the hard tissues and pyorrhea alveolaris, are the prominent ones which our profession is called upon to treat, it is astonishing that the clear principles of the theory and practice of prevention have been so sadly neglected. I have repeatedly proclaimed that the profession does not really care for prevention. Dentists, in the first place, will not themselves employ preventive measures, and secondly, they are not ready for preventive dentistry. A mouth is examined, first to find cavities of dental caries and next to find pyorrhea, a definite stage of a chronic disease of the gingivæ and pericementum, and if there are no evidences of these diseases the patient is dismissed as sound and requiring no dental service. Dentists have so persistently followed this course that I have urged as earnestly as I have been able the establishment of a sub-specialty, consisting of trained women whose distinct function shall be to keep the mouths and teeth of people *clean.*

Dr. Rhein of New York has earnestly advocated these measures, and proposes the name "dental nurse" for this sub-specialty. He has laid stress on the importance of this work not for esthetic but for prophylactic reasons, and I have tried to have the dental college accept these women students for instruction in the practice of cleaning the teeth and massaging the gums—*i.e.* healthy teeth and healthy gums—in order to *prevent* disease. Every mouth can be benefited by skilful prophylaxis. It is a case of the well, not alone the sick, needing a physician.

Unfortunately the term prophylaxis is becoming misused, and is applied to *treatment* of a disease. "Prophylactic specialists" attempt even to *cure,* while prophylaxis in its proper meaning does not relate to curing. It means expert surgery for the prevention of a possible attack of disease, as Dr. D. D. Smith has so clearly demonstrated to the profession, and expert manipulative methods for the prevention of recurrence of a disease after surgical therapeutics have accomplished the "cure."

This clearly defined province of prophylaxis adds to the duties of the dentist another specialty of as distinct a character as the operative and the mechanical branches. The prosthetic, the operative, the orthopedic, the prophylactic, and the surgical dentist are practitioners of any one of these well-defined special departments of the science and art of dentistry, each of which requires special taste, talent, and training. How many fine gold operators, to use our professional parlance, do we know who cannot mold, swage, or solder in the construction of an artificial denture? How many operative dentists can really and skilfully perform that most important and yet that neglected operation of preventive dentistry, *cleaning of the teeth,* without injury to the delicate gingival festoons? The essayist in his paper has vividly shown the necessity for training in this neglected department of prophylaxis, and has detailed a method of training, and described the class of women who will be best suited for this training. The methods proposed appeal forcibly to me, as they constitute a system which, if followed, will revolutionize dentistry. While I have advocated and published schemes of education and theoretic curricula for adoption by colleges, I have never been clear as to *how* to train the student in this novel branch. Dr. Fones' paper is worthy of the careful study of every dentist for his own sake, and of every college faculty desiring to educate practical prophylacticians.

Dr. M. L. RHEIN, New York, N. Y. Without a careful reading of the essayist's paper, it is impossible to appreciate fully the argument so well advanced by him in behalf of preventive dentistry. The arraignment of the average practitioner for his shortcomings and the logical deduction as to the value of prophylactic treatment are generally accepted matters at the present day. The crux of the subject is found in the essayist's final analysis that this work will only be faithfully done for the many when assistants, not necessarily graduated dentists, are especially trained to perform this work under the guidance of the dentist. To stand shoulder to shoulder in the firing line with the essayist, I have agreed to take part in the discussion of this subject, but I crave your indulgence for too much personality. It is over twenty-eight years ago that I first read a paper on "Oral Hygiene" before the First District Society of New York, in which I endeavored to show the value of a clean mouth in the same way as has been done so ably by the essayist today. I have been unremitting ever since in my efforts in this direction. I soon discovered that calm, logical, and dispassionate argument produced but few followers. I refuse, however, to enlist among the demagogs or extremists who have injured the greatest advance in dental therapeutics by exaggerated claims and erratic pathologic doctrine.

Year by year I watched the sane advocates of a clean mouth growing in numbers, until in 1903 I thought the time ripe for a paper such as we have listened to. Twice in the spring of that year I presented the subject under the title of "The Dental Nurse." The first presentation, made at New Orleans before the Stomatological Section of the American Medical Association, met with such a cordial reception that, when I again presented that paper a few weeks later before the New York State Dental Society, I confidently accompanied it with a proposed legislative enactment to legalize and properly restrict the dental nurse. To my great disappointment my state society did not appreciate its opportunity to inaugurate this great progressive movement. On the contrary, a short-sighted opposition defeated my purpose.

Like every great issue in which justice and right must eventually gain the victory, this cause has been quietly but surely gaining strength both in numbers and soundness of doctrine, and has brought to us today the masterly protest of Dr. Fones which has thrilled this audience. The victory is, however, by no means won so easily. If it were merely a matter of proving the correctness of what the essayist has said, this question would long since have been settled. Unfortunately, it has reached a stage where the opposing forces consist of personal selfishness and aggrandizement, narrowness of conception, and shameless cupidity, as opposed to unselfish work for humanity at large.

The opponents of the dental nurse may be divided into three classes. First, the class of dental colleges which is governed by men who fear lest every radical movement may upset the frail foundation upon which their institution rests. The colleges which are governed by men who are working with the object of continually elevating the status of our profession have nothing to fear from this cause, and they will be found among its strongest advocates. The second class is confined to a very small number of men so filled with conceit that the idea of a mere woman being able to wield an orange-wood stick with dexterity comparable to their own is in their eyes nothing short of sacrilege. All this opposition carries with it little weight, but the argument of the third class of opponents is of a different nature. This is composed of men who have never paid any attention to oral hygiene. Any requests of their patients for prophylactic work have been met with the superficial cleansing described by the essayist, which generally is a great evil instead of the benefit it should be. These practitioners know nothing of the "mouth beautiful" in their own practice, and are influenced in their vicious opposition to carrying the blessings of a clean mouth to the masses by everything but love for their fellow men. They appeal to the purse, to the cupidity of the dentist. They claim that the licensing of non-graduates to do prophylactic work would throw down the bars for illegal practitioners, and thereby take away a large part of the practice from the legalized practitioner. There is not a spark of evidence to justify such an opinion, but, on the contrary, a logical deduction as well as the experience of those employing dental nurses amply demonstrates that the opposite condition prevails. In other words, the dentists who have made use of the trained dental nurse have found that she not only adds to their own income but tends to rapidly increase their practice, and what is of far greater importance, strengthens the belief of their patients in the value of the dental services which they receive.

Even if the opposite conditions of affairs were true, and the danger from permitting free scope to the dental nurse were all that the opposition claimed, it would be most unethical for us to oppose it. What is our real position in the community? Are we professional men, or mere artizans of a trade? If we are doctors of the human body, dedicating our lives to healing and repairing the ills which we find in the oral cavity, then we are the priests of the people and true professional men; then everything that tends to further a better physiologic condition of the human teeth not only in our own practice, not only in our own country, but in the whole world, should have our first consideration, and as much of our material aid and assistance as we can afford, if we are to live up to the rank of a profession.

Dentistry, in its ideal conception of repair of diseased and broken-down structures and replacement of lost tissues, will always remain a luxury. Even with the poor understanding that we have to-day of the law of immunity, we realize that prophylaxis for the masses would be infinitely more valuable than the inferior tinkering which so many receive.

Is there any other way in which the gospel of a clean mouth can be brought to the multitude of school children—to humanity at large? There is no doubt in my mind that when the members of the profession understand this question sanely and appreciate it properly, they will be found espousing this cause.

It will then become a simple matter to legislate so that the dental nurse should have certain qualifications both in primary and professional education. These nurses will be restricted in the performance of work in the mouth to the simple removal of deposits and polishing the surfaces of the teeth and application of remedies. They will not be permitted to practice on their own account, but confined to doing this particular work under the guidance of a legally qualified practitioner or the proper authorities of some public clinic.

Dr. N. S. HOFF, Ann Arbor, Mich. If we are to train only dental assistants in our offices, the plan outlined by the essayist is a commendable and a practicable one, and I am very glad to indorse it as such; but if we are to undertake the educating of skilled and intelligent assistants, who are to do real prophylactic work intelligently and scientifically, I do not believe it should be done in any such manner. If we are to give over the instruction of these assistants to the members of the profession in general, the large majority of whom will not take the time nor the pains to qualify themselves, what kind of a product shall we have, and what will be the effect on our professional standards? It would be very unwise for any college to add a professorship devoted to this subject and give such instruction as has been outlined here. I do not think many practitioners would be willing to sanction such a course, or to issue a certificate of competence, or even acknowledge that they had students of that kind under instruction. If the essayist means that we should instruct someone merely in cleaning and polishing the crowns of teeth, I very willingly agree that many apt persons, when trained, can do that kind of prophylactic work; but that is not real prophylaxis at all. Complete oral prophylaxis cannot be done by any such persons; it involves a great deal more and is of far greater importance than the simple polishing of the surfaces of the teeth. It requires many times as much intelligence and skill as the treatment of an abscess, or of necrosis, or of many other diseases we are accustomed to consider as demanding our highest skill and knowledge. I do not believe that any dentist would be willing to allow such an assistant to fill root-canals, much less to treat an abscess or disease which is likely to involve extensively the surrounding tissues of the teeth.

It seems to me undesirable to begin this work in the way proposed. If we cannot induce and educate enough dentists to undertake this most important work, I am willing to engage educated nurses and train them to polish the crown surfaces of the teeth, but I must object to calling this oral prophylaxis, for the reason that true prophylaxis invo'ves a great deal more.

Time forbids me to outline my conception of oral prophylaxis. I have been working most carefully in this field for four years, and I have found it to be very much broader than I thought when I began. I am confident that no one can do justice to prophylaxis after only a few months' training, no matter who the instructor or what his system of instruction may be.

I do not wish to dissent entirely from the essayist's plan, as the provocation is great for the relief of the busy practitioner, but I hope that we shall not let our need influence us to bring disaster to the most promising field in preventive dentistry. Neither should we attach to our profession improperly trained specialists.

Dr. Fones (closing the discussion). I am a little surprised at Dr. Hoff's remarks. After having worked in the field of prophylaxis since 1900, and having practiced dentistry twenty-one years, I feel that I have a right to a decided opinion in this matter. Dr. Hoff will not treat this polishing operation so lightly six or seven years hence. The work of these assistants is not intended to cover the entire field of prophylaxis. I am the prophylactic operator in my office, and the assistant merely helps me to prevent dental diseases. In a new patient, all teeth are placed in a perfect condition as I conceive the meaning of this term, and my assistant aids me in the future surface treatments for prevention. Our records show that by following a definite system of home care and office treatment, future operations can be reduced fully eighty per cent. When Dr. Hoff makes light of this treatment by polishing, he does not realize its wonderful results. I have great respect for his ability and believe him to be one of the cleverest men in dentistry, but he does not seem to appreciate why I advocate a prophylactic assistant of this type. The polishing of the surfaces of the teeth is but a branch of prophylaxis. But what dentist wishes to spend all day in polishing teeth? I would give up dentistry if I had to do that. What is there in dentistry for a man of ability and intelligence, if he is to spend his life polishing teeth? Yet, if these wonderful results are to be obtained, this polishing must be done, and the employment of an assistant seems to be the only solution.

Dr. Rhein has made one remark that I wish you would all remember, namely, that good operative dentistry will always remain an expensive luxury. The masses need prophylaxis, and these surface treatments of the teeth can be given at a reasonable enough price so that they will be within the reach of those who cannot afford the luxury of good dentistry. Prophylaxis must be inaugurated in the public schools for the benefit of the masses.

The next order of business was the reading of a paper by Dr. W. H. O. McGehee, Cincinnati, Ohio, entitled "An Experimental Study of the Tooth-staining Properties of Various Colored Dentifrices."

[This paper is printed in full at page 289 of the present issue of the Cosmos.]

Discussion.

Dr. J. S. Cassidy, Covington, Ky. In discussing Dr. McGehee's timely and very instructive paper, we should notice that he does not deal with the effects of dead pulps on the color of the teeth, or the stains caused by tobacco, condiments, foodstuffs, and local uncleanliness. He selects for his investigation a few agents that are intended to be the bitter enemies of such conditions, a few of the many drugs and preparations that are in daily use as antiseptic detergents by the laity, and, more or less, as therapeutic agents by the profession. The names of these preparations signify but little, as they are nearly all of proprietary or commercial origin, with the ingredients incorporated according to the ideas of each originator. These powders, pastes, and washes *ad infinitum* contain a variety of organic and inorganic mixtures, with coloring matter introduced to suit the individual fancy; perhaps in a few cases the shade of color is developed by spontaneous chemical change or through chromo-atmospheric influence.

We can easily understand the effects on the teeth of the familiar coloring matters, such as anilin, blue and red, carmine, hematoxylin, etc. But when teeth are colored by preparations which have no coloring matter added, we cannot prognosticate the extent or the exact cause of such effects, except by sufficient experimentation. Indeed, the knowledge of the spontaneous interaction between carbon compounds and their coloring effects on organized structure, vital or non-vital, in connection with the lively chemical action prevailing in the average human mouth, is still in its infancy.

In reading over Dr. McGehee's monumental work, we find that the worst offenders may be reduced to seven. Six of these, including powders, pastes, and liquids of various composition, are colored artificially, and this objectionable feature can be easily eliminated without injuring their value. No. 7, however, which contains perhaps no artificial coloring, we find affects the color of the tooth substance more than any of the other preparations, and the question naturally arises, Shall we discriminate against this, in my opinion, excellent collutory on account of this one fault, great though it be? It is presented ready for use by one of the best pharmacists in the profession. Its combination of inorganic and organic antiseptics is ideal, and its slightly acid character, intended to inhibit the growth and multiplication of acid-forming bacteria, conforms with the latest scientific views. Whatever be the cause of the coloring effect, a phenol or derivative of essential oils assisted by oxygen in the nascent state, can be replaced by an equally effective non-coloring substitute.

The results of Dr. McGehee's gigantic work may be a blessing in disguise in another direction than the one intended. Perhaps Dr. McGehee has unwittingly placed his name on the roll of fame, not only by his successful experiments, which are in accordance with and in advance of Dr. Head's proper advice, but also by proving the fact that certain mouthwashes, not artificially colored, penetrate the enamel and dentin, thereby suggesting the possibility of embalming the dental tissues against caries through deposits of resins, oleoresins, camphors, etc.

Perhaps the reprehensible practice of the Ceylonese, from time immemorial, of thoroughly blackening their teeth is persisted in not so much for the purpose of adding to their personal beauty as it may mark a prophylactic effort to render these organs immune from the otherwise ever-present danger of disease.

Dr. H. T. SMITH, Cincinnati, Ohio. I have seen so much of Dr. McGehee's work for the preparation of this paper, that I wish first to impress you with the large and very evident amount of time and labor that he has expended.

Dr. Cassidy has discussed discolorations from the chemical standpoint; I should therefore like to say just a word in regard to the distinctly histological features of the subject.

Dr. McGehee has shown that teeth are readily stained in the mouth by the persistent use of mouth-washes—collutories.

This being the case, the most regrettable incidents of such staining occur in the mouths of the young and middle-aged, before the teeth naturally discolor from food habits, tobacco habits, or reparative dental operations. The enamel covering in young teeth is, as a rule, intact, little if any dentin being exposed on the incisal and occlusal surfaces. These preparations, therefore, must exert staining effects *upon*, or *in*, or *through* enamel surfaces.

In the enamel, nature has provided a curious and beautiful tissue that resists the wear and tear of daily use and abuse, but in which little or none of the usually well supplied organic tissue is left. How, then, does enamel take up the staining agents?

Enamel is entirely wanting in vascularity. The organic reticulum which Heitzmann and Abbott imagined they saw in enamel, and which they thought took up hematoxylin and eosin stains, has been proved not to exist. If it did it would help us to understand the entrance of the mouth-washes which Dr. McGehee has mentioned. The enamel prisms are highly calcified, and hardly less so is the interprismatic substance.

The question therefore arises, Is there a constant flow or passage of salivary moisture through this dense substance? We have all seen the change of color or translucence in teeth when they are dried, with the rubber dam in position.

The problem before us is easily explained in regard to the dentin. The tubular, organic, and fibrillar structure of this tissue is well understood; it readily absorbs liquids and even permits their rapid penetration if introduced by means of high-pressure syringes.

The analyses of enamel given by Von Bibra and others indicate the presence of 3.6 per cent. of organic matter; but this is determined by the loss of weight upon ignition in the analysis, and Tomes shows that this loss is occasioned by the rapid expulsion of the water of composition in the calcium salts. Therefore it may be said that there is no organic matter in enamel.

The enamel of some animals is permanently stained. Examples are found in the reddish incisors of the squirrel, and still better in the highly colored teeth of the beaver, and it may be interesting to note in this connection that the order of marsupials, the kangaroo and the opossum, the latter being the only surviving representative of this order in America, exhibit excellent examples of tubular enamel, the dentinal fibrils and tubules penetrating the enamel structure in large nunbers.

In the human tooth we believe that the various shades of color reside in the dentin, and that the enamel is translucently colorless.

There may be a natural flow of moisture through the enamel, resembling osmosis, as through a fine stone disk, or through a membrane. If this is the case, we can account for the staining effects of mouth-washes, but we must still believe that the permanence of the stain rests in the protoplasmic—organic—tissue of the underlying dentin.

I leave this unexplained phase of the subject with you and Dr. McGehee for his future investigations, for I know that he is keen to expend another thousand hours upon these researches. I would remind you, however, of a fact often overlooked, namely, the relatively great thickness of the enamel in the human teeth, as seen in sections of teeth.

Dr. Johnson said yesterday that the use of mouth-washes is not to be encouraged, that healthy mucous and dental tissues do not need medication. This we may perhaps admit; but there is that perfect balance of waste and repair to be found that will show absolutely normal conditions in such a cavity as the mouth? Unnatural food habits, a slightly disordered condition of the saliva, of the oral or nasal mucosa, so frequently occur even in the cleanest mouths that antiseptic mouth-washes or dentifrices are almost essential, and under the influence of the present prophylaxis propaganda, their use will be considerably increased rather than lessened.

Dr. McGehee has rendered an important service in warning us of the dangers of accepting and prescribing compounds that stain the teeth.

Motion was then made and carried that Section III adjourn until the next annual meeting of the association.

[For CLINICS, see subsequent issue.]

[DISCUSSION IN SECTION I.]

Discussion of Dr. C. S. Case's Paper, "The Question of Extraction in Orthodontia," read before Section I.

FOLLOWING is the discussion which ensued upon the reading in Section I of the paper by Dr. C. S. CASE, Chicago, Ill., Part I of which will be found at page 137 of the COSMOS for February, and Part II at page 276 of the present issue.

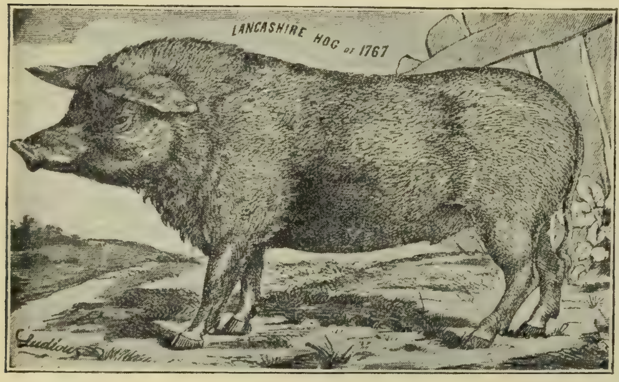
Discussion.

Dr. M. H. CRYER, Philadelphia, Pa. It gives me much pleasure to have had the opportunity of hearing Dr. Case's paper, as I consider the essayist to be a man who thinks before he acts, and one who studies his cases in all their phases. He lays down no dogmatic rule to fit all patients, and is willing to listen to and accept facts from those who may differ with him. The only fault I can find with the paper is that it contains but few vulnerable points for me to attack.

In looking for some point, however, on which I might find an excuse to differ with him, I find the following: "Never extract a tooth for the purpose of making the operation easier." Suppose the patient to be a weak, delicate, and nervous child, perhaps with chorea or epilepsy, in whom the irregularities of the teeth and the nervous condition were brought about by the same causes either before or after birth, and in whom it was found that the mechanical appliances, though ever so nicely adjusted, increased the nervous condition, interfering with proper rest, mastication, digestion, etc., would it not be better to make an exception in a case of that kind, if the operation could be made easier for the patient by extraction of a tooth?

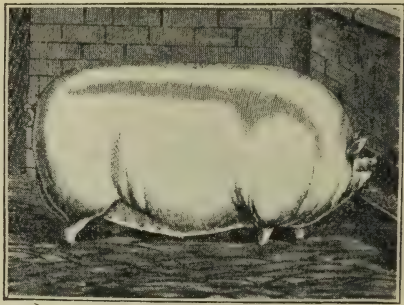
Dr. Case disagrees with those in the dental profession who claim that irregularities of the teeth are invariably due to causes operating after birth, as well as with those who believe that malpositions of all classes, including impaction, can be avoided by preventive methods. I also cannot agree with these writers. I would much rather take a firm stand that all irregularities and malpositions of teeth, barring those produced by accident, are the result of causes operating before conception. I fear that those who claim that all causes of irregularities of the teeth are post-natal have not read, much less studied the laws relating to heredity and breeding. The investigations and writings of Mendel, Darwin, Weismann, DeVries, Burbank, and others teach us that all variations except those resulting from accident are governed by the laws of inheritance. In order to show how fixed this matter is in my mind I would like to bring to your notice my personal experience with reference to laws of heredity and breeding by careful selection in my younger days, and the application of these laws to my own specialty, which has made me a firm believer in these facts. My achievements in this respect in winning prizes in the city of Cleveland alone would confirm the accepted laws of heredity. The following are some of the prizes won by animals owned by me and bred according to the above-mentioned laws: In 1856, Ohio State Fair, saddle horse "Hassan;" in 1862, Ohio State Fair, best thoroughbred stallion and best stallion of any age or breed, "Bronx;" in 1871, Northern Poultry Association, best collection of game fowls and pigeons; in 1872, Northern Ohio State Fair, best boar of any age or breed; in 1888, best kennel of pug dogs. Incidentally, I may say that if I were to exhibit today in Cleveland, I would show pedigree roses that had been bred according to the laws of Mendel, and would expect to win over those not so hybridized.

FIG. 1.



Lancashire hog. Prize-winner, 1767.

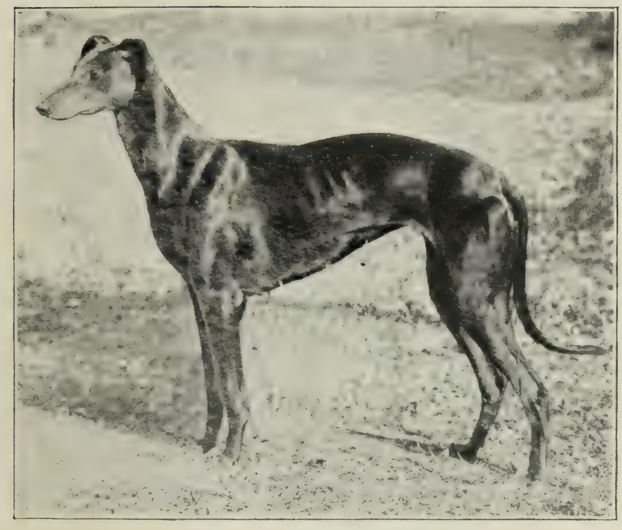
FIG. 2.



Lancashire hog. First prize, 1867.

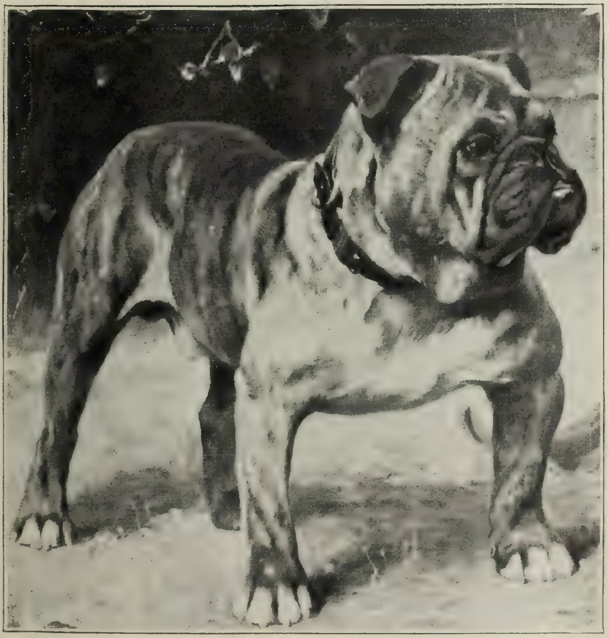
It is by application of these laws that new varieties of plants and animals are produced. The American trotter is one of the best examples of modern breeding. By a study of the forms and temperaments of the fastest trotters, selections have been made with good results. The first products were found to be lacking in stamina, so the blood of the thoroughbred was introduced. In selecting the thoroughbred horses, the peculiar forms belonging to what might be termed natural trotters were used as far as possible. As the thoroughbred horse has a natural tendency to the running motion when going fast, many of the trotters produced by this system of breeding had certain irregularities of motion that in some cases caused them to "interfere," *i.e.* to cut themselves when the feet were passing each other in this artificial action. The orthopedic surgeon of the trotting horse was frequently called in and used various appliances, such as bands, cords, toe-weights, etc., to the legs and feet, on principles similar to those used by the orthodontist in applying bands and wires to correct irregularities of the teeth. But the scientist was determined to overcome these defects, and by scientific means of breeding and following the laws of heredity, horses have been produced that can do their work with a clean and free movement without mechanical appliances for the correction of irregularities. Were conditions suitable, man could do as much for the human mouth. The orthodontists who believe that all irregularities of the teeth are of post-natal origin will never accomplish this any more than the stay- or splint-maker will produce children with straight bodies and legs. He can only correct the defects of the individual, just as the horse-jockey corrected the interference or irregularity of

FIG. 3.



Greyhound.

FIG. 4.



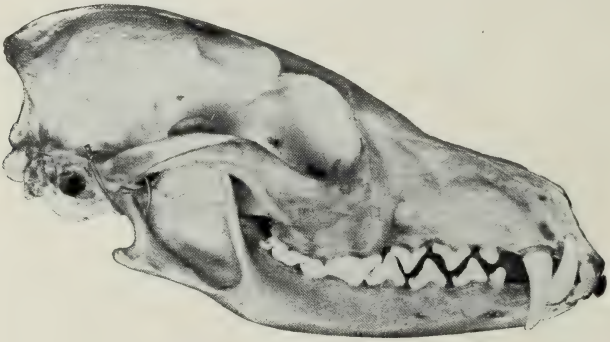
Bulldog.

the individual trotter. Unfortunately, the breeding of the human family is but slightly under the control of any laws governing selection for reproduction. Where it has been under control, marked results have been obtained.

I wish to throw upon the screen a few pictures of animals that have been bred according to the laws of heredity. Fig. 1 shows a pig which won first prize as the best white hog at a Royal Agricultural Show in England; Fig. 2 is a picture of a hog which won the first prize at a show of the same society one hundred years later. These two pictures are intended to show what a study of the laws of heredity and breeding will do in a hundred years. It was with a descendant of the second animal that I won the first prize in Cleveland in 1872.

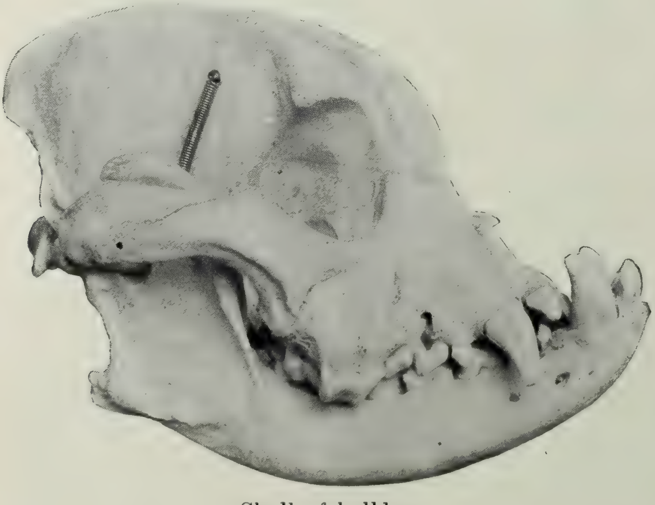
Fig. 3 depicts a greyhound, a dog that has been bred for hundreds of years for the express purpose of coursing the hare, in which no other dog can compete with him. The pedigrees of these dogs are more carefully kept in England than the

Fig. 5.



Skull of greyhound.

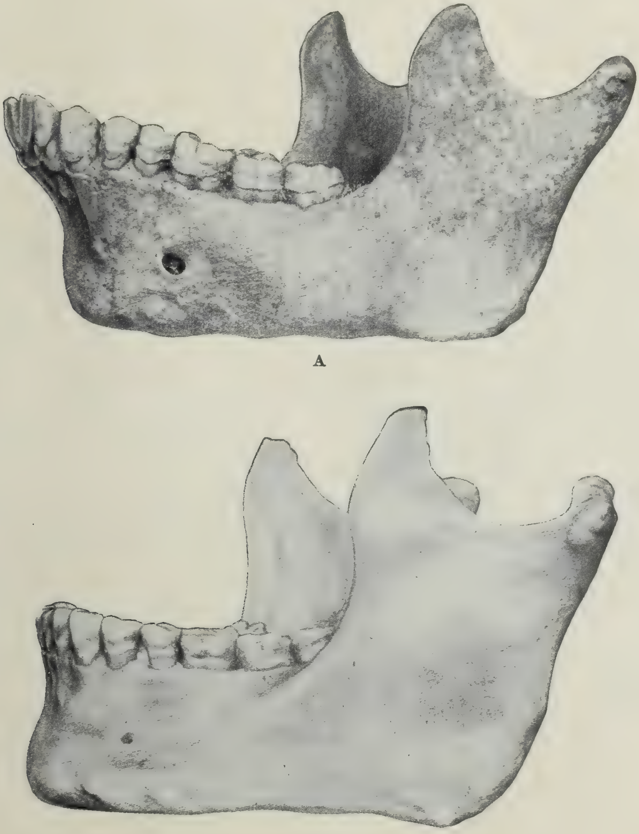
Fig. 6.



Skull of bulldog.

records of the sales of land. This dog is bred for endurance and fast work, with quick-turning attributes and with jaws that can take hold of his game, while he can breathe through the mouth at the same time.

Fig. 7.



Two mandibles. A, From an adult of the Fan tribe, of West Africa. B, From an adult Caucasian.

Fig. 4 is a bulldog, which forms a contrast in nearly every respect to the greyhound.

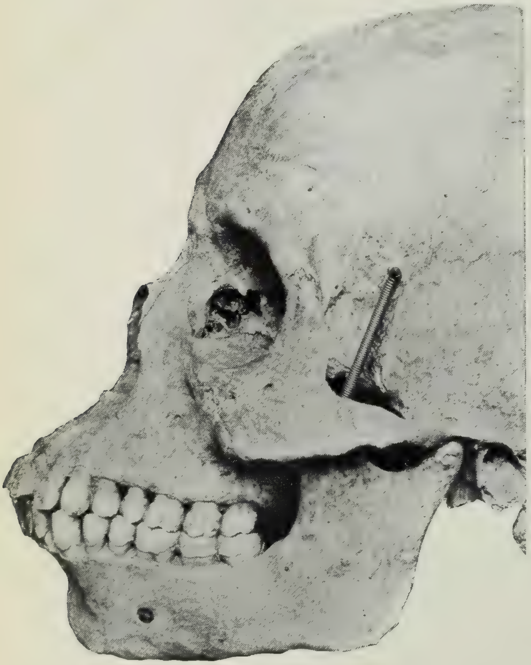
Fig. 5 is a side view of the skull of the greyhound, with a fair occlusion of the teeth in the position which his breeders consider the best form for the purpose intended.

Fig. 6 is a side view of the skull of a bulldog, bred for the peculiar fancy of irregularity of the jaws and teeth. I do not know in what class Dr. Case would place this irregularity, or whether he would advise Angle's appliances, Baker's anchorages, or Jackson's cribs for its correction. Each of these animals was bred by the laws of inheritance for special purposes, *i.e.* the shape, attributes, and irregularities of the jaws and teeth were *prenatal* in origin.

Dr. Case presented two slides in one of which the lower anterior teeth are shown to be lingually inclined, while in the other they are labially inclined. I wish to take the liberty of showing similar conditions.

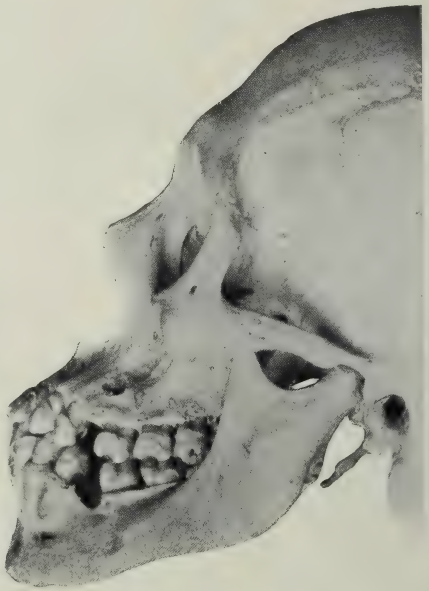
Fig. 7 shows two lower jaws; the one below, B, is of a white person and is almost typical, with the teeth in the position normal for this character of skull, and the occluding line about correct for that age. The relations of the body and ramus are good, forming about a right angle. The third molar is somewhat hidden behind the anterior border of the ramus. The mental foramen is about midway between the lower border of the jaw and the top of the alveolar process, and between the roots of the first and second premolars. Anterior to this there is a good chin or mental process, with the front teeth in harmonious position. The mandible above, A in the picture (Fig. 7), is from a West African negro; the ramus and body in this case are in almost the same relation as in the other jaw, forming nearly a right angle, but along the upper border anterior to the ramus there is quite a difference. The teeth are advanced in the jaw by the width of a molar. The mental foramen, rather a fixed point antero-posteriorly, is under the first molar instead of being on a line between the roots of the premolars. The lower portion of the mental process is about normal, producing an harmonious facial outline, but its upper portion or alveolar process is carried forward along with the anterior teeth, which have labial inclination. In this negro jaw all the teeth have been carried forward by the full width of a molar, and it is more than likely that the cause of this formation has been in operation since prehistoric times. Let us articulate this jaw with the rest of the skull (Fig. 8) and we will have a normal occlusion, barring, perhaps, the incisors. There is a great natural law which, when not interfered with mechanically or through misalliance, causes the upper and lower teeth to find their proper positions for good mastication. In the picture before you (Fig. 8) the maxilla proper is placed well forward in the cra-

Fig. 8.



African (see A, Fig. 7).

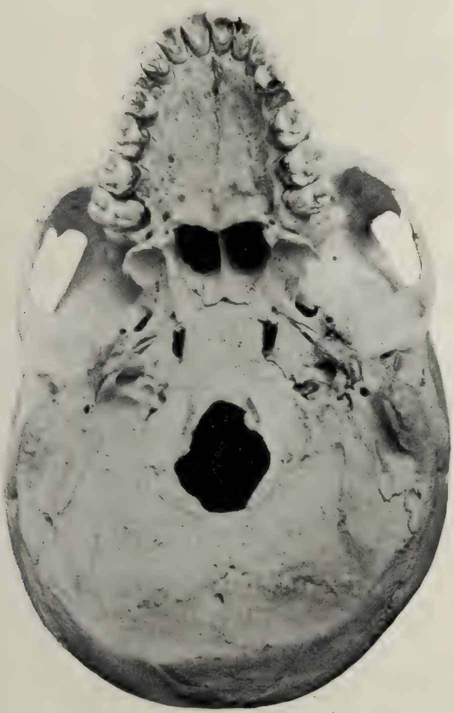
Fig. 9.



Of mixed breed.

nium, the distance between the free edge of the hard palate and the foramen magnum being a full centimeter greater than in the average skull, so that the teeth are not carried forward by extension of the alveolar process alone, but the whole jaw is also forward. The true mandible is not much out of shape, but the teeth in hunting for their antagonists, or bite, have carried the alveolar process and the cancellated tissue forward, on the same principle as the dentist carries teeth forward by mechanical means, the alveolar process following, but the true bone does not advance in either case.

Fig. 10.



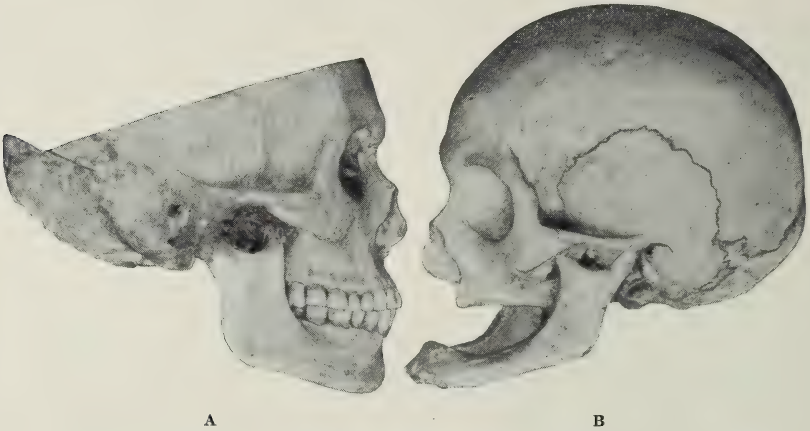
Under surface of skull shown in Fig. 9.

Fig. 9 is taken from a person of mixed breed. Unfortunately, "pernicious extraction" or decay has broken up this arch. This is a case where the maxillæ are carried well forward by a long basilar process. The lower ends of the pterygoid processes are also far forward; in fact, the whole upper jaw is advanced by about the width of a molar, and the alveolar process is advanced as well as the jaw proper. The anterior teeth have just about found good occlusion without giving the appearance of receding chin or without slanting forward or producing a labial inclination of the lower incisors. The point of the chin is slightly prominent, with the teeth lingually inclined, just the reverse of the last picture. A plaster cast of these teeth and alveolar processes would convey no idea of how this occlusion was brought about, but a careful digital examination of the mandible or a good X-ray picture would show that instead of the normal right angle, this mandible has a very obtuse angle, throwing the body of the jaw and the line of the teeth forward, so far forward in fact as to necessitate a lingual inclination of the anterior teeth. As these prognathous jaws are not in harmony with the Caucasian characteristics of the rest of the skull, much argument could be introduced as to the proper mode of treatment to produce in this patient a better facial alignment. It is unfortunate that there cannot be brought about a resorption of tissue that is not required, or a building up of new bone where it is lacking, to make more pleasing features.

Fig. 10 is a picture of the under surface of Fig. 9. It shows how far forward the jaw is placed, and the great distance between the anterior border of the foramen magnum and the free edge of the hard palate and cutting edge of the incisors. The latter measurement is 11 cm., which is within 7 mm. of that of the most prognathous skull I have, shown in Fig. 8. The distance horizontally from the anterior margin of the foramen magnum to the vertical plane of the most posterior point of the skull is 9.5 cm., being shorter than in many Caucasian skulls. These measurements, to my mind, show that the anterior portion of this particular skull is very similar to the prognathous skulls of West Africa, and the posterior portion is much like that of the Caucasian skull of Europe.

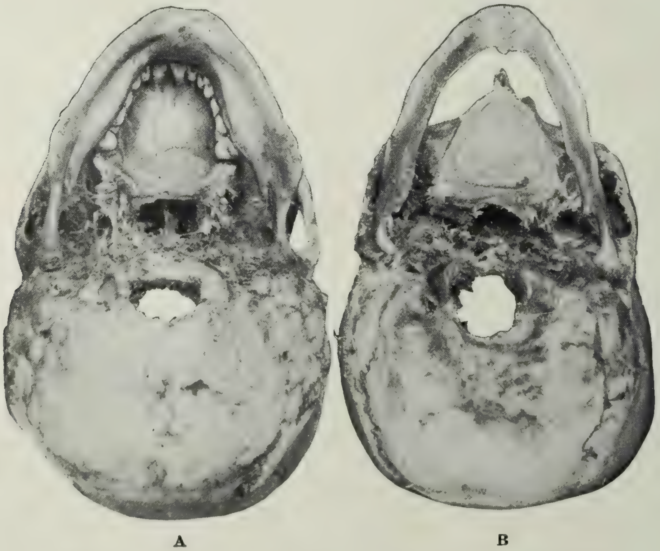
Dr. Case has stated that new bone cannot be induced to grow beyond its inherent size. I believe, at the present time at least, that he is right; what I may think tomorrow is another question—it will depend to a certain extent on what is meant by new bone. If new bone can be induced to grow, I would like to know the nature of the growth, whether it is hypertrophic in character, as in the patient shown by Dr. Case in the three pictures on one slide, or whether it is hyperplastic or neoplastic. I have seen several enlargements of bone—I do not speak of the alveolar process—following the endeavor to correct irregularities

FIG. 11.



Side view of two adult skulls. A, From a subject about twenty-five years old. B, From one well advanced in years.

FIG. 12.

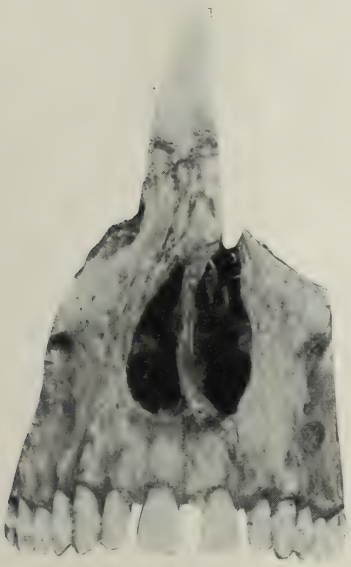


Under view of the two skulls shown in Fig. 11.

of teeth, that were hyperplastic in character. One of these terminated fatally, and the others recovered after removal of a large section of bone. I feel like cautioning anyone against starting a neoplasm, for when it has once been started it is very difficult to control the new growth.

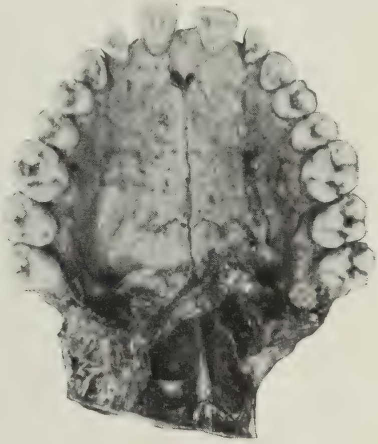
Fig. 11 gives side views of two skulls. The one on the left, A, is that of an adult about twenty-five years of age, having a full set of normally occluding teeth. The picture on the right, B, is from a person of seventy-five years or more, all the teeth having been lost and the alveolar process resorbed long before death. A comparison of these two skulls gives a good idea of how much more important the alveolar process is than the true bone in building out the lips and face in that region.

Fig. 13.



Showing wide separation between incisors.

Fig. 14.



Under surface of maxilla shown in Fig. 13.

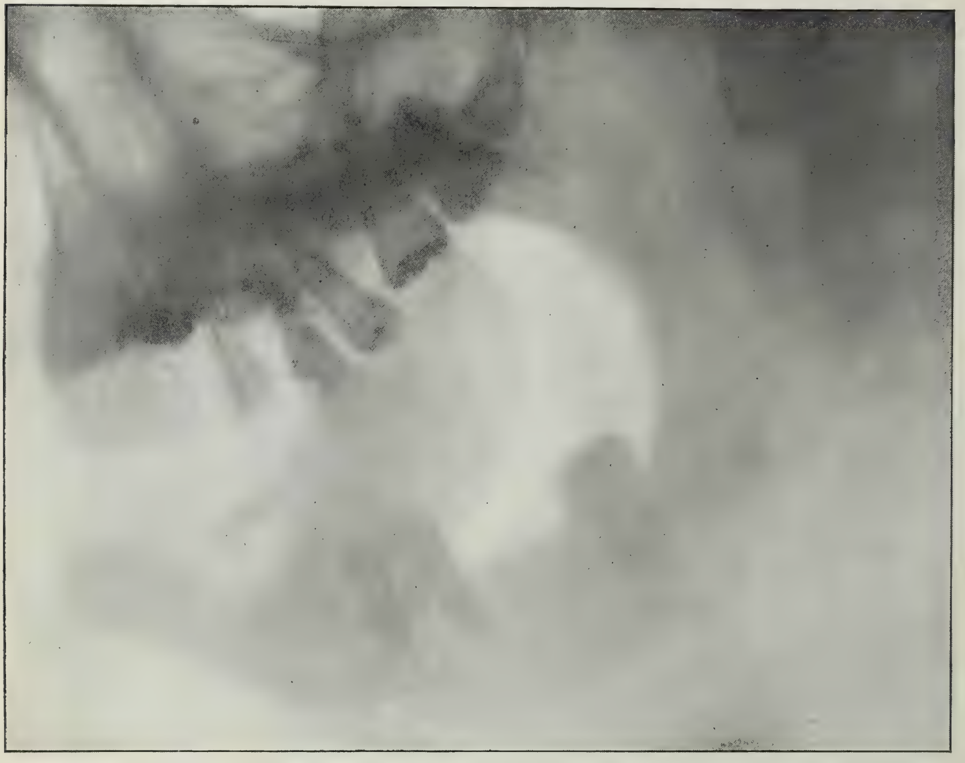
Fig. 12 shows the under side of these same skulls, that on the right indicating about the true size of the upper jaw proper, while that on the left shows a jaw of about the same size plus the teeth and alveolar process, which comes and goes with the teeth. If we look at the roof of the mouth in the pictures on the left, we see the bone formed by the palatal processes of the maxilla and the horizontal processes of the palate bones. It is the suture through the center of this roof that some of the orthodontists and rhinologists claim they can open by applying a force to the superstructure which is temporarily fixed upon it. A writer in the July issue of the DENTAL COSMOS says that the space produced between the bones is afterward filled with cartilage or new bone. I have been unable so far to obtain proof that the suture has been opened and filled with new bone. The supporters of this theory have given several reasons for their belief, but I fear these would not be accented by a jury composed of anatomists, physiologists, and pathologists.

One of the proofs that these men offer to show that the suture in the roof of the mouth has been opened is that by expanding the arch the space between the central incisors can be increased. The teeth are set up in comparatively soft bone, with its interlacing fibers; these, however, do not cross the median line from one side to the other, so some separation of the process may take place at this central line, but it does not extend to the true suture between the maxillæ proper.

I am of the opinion that when the dentist applies sufficient force to move the teeth, they will advance in the direction of least resistance, and owing to this constant pressure of the tooth against the process, the latter breaks down and becomes resorbed and the space made by the advancing teeth will be filled with new bone of the *alveolar* process. I do not believe that the whole process is carried out *en masse,* as one would push out the wall of a house, consequently the suture cannot be opened by this method of spreading the arch.

Fig. 13 shows a wide separation between the incisors in the median line, and also some separation between the centrals and laterals and canines. Has a force been applied to the teeth which has carried them out to form a larger arc of a circle? And if so, has the intermaxillary suture been opened and the floor of the nasal cavity widened? If this is the case, it might be well to ask of those who believe that the above is correct, a practical question at this point: If this jaw is so wide as to be unsightly, can a force be applied to the teeth to narrow the arch? In so doing would not the palatal arch be compressed and the floor of the nose narrowed and the nasal septum deflected? It is generally stated by those who claim that they can widen the nose that a wide arch is nearly always accompanied by a wide floor of the nose. But the specimen before you and the numerous other skulls that I have examined tend to show that the opposite is the rule, *i.e.* a wide arch is often associated with a

Fig. 15.



X-ray picture showing impacted molars.

narrow nasal floor and a narrow arch with a wide nasal floor. I do not believe there has been any mechanical force applied to these teeth (Fig. 13) which brought about the wide arch and separation of the anterior teeth, but I am firmly convinced that the cause of this condition originated before conception of the individual to whom the jaw belonged, through operation of the laws governing inheritance and breeding;—you may say, if you like, that the small teeth were derived from one side of the family and the large jaw from the other. Let us turn this jaw over and look at the palatal surface, and see how much the intermaxillary suture has been opened.

In Fig. 14 you will see that the suture has not been opened one particle.

Fig. 15 is used at the request of Dr. Case. It is made from an X-ray picture of a patient about twenty-four years of age. It shows three impacted upper molars on the left side. The first molar has a portion of the occluding surface uncovered by bone; the second is well covered, while the third is far up in the posterior wall of the maxillary sinus, with its masticating surface resting against the posterior portion of the second molar.

In the lower jaw the first and third molars were impacted, but were extracted before the picture was taken. There are also impactions on the right side of the jaws.

This patient has two brothers and three sisters. The two brothers and two of the sisters have impacted teeth; the third sister has not been seen by the writer. As there are so many impacted teeth in the family, one might naturally ask if either of their parents had impacted teeth. They had not. The teeth of the parents were in early adult life in fairly good positions, their sizes about corresponding to the individual. But here is a point worth considering: The mother was a fine, small individual, weighing about ninety pounds and under five feet in height, the father just the opposite, large, over six feet in height, and weighing over two hundred pounds. I will leave you to judge this as you like, and will only say that, from the standpoint of a breeder of domestic animals for exhibition, such a combination would be considered as injudicious "crossing."

Dr. Martin Dewey, Kansas City, Mo. From the title of the essayist's voluminous paper one would expect that the subject could be disposed of in a very short time, but after listening to the essay one wonders whether it is on the question of extraction or on personal views of art; whether the essayist intended to speak on the inheritance of family types and of malocclusion, or on the development of the jaws both from an embryological standpoint and the point of mechanical stimulation; whether he wished to discuss the question of early regulation, or of waiting until the case was as bad as it could possibly become; and lastly, whether the paper is a presentation of scientific facts or an attack on the teaching of someone else. Whatever the essay is, may be, or was intended to represent, the necessity of discussion lies not in the fact that I hope to convince the essayist or my predecessor in the discussion, but that certain statements have been made which I do not think to be true. Science is cruel, nature is cruel, and when one advances as broad and as positive statements, at as great length, as have been made today, he must bring good proof, or expect someone to differ with him. My remarks will therefore be not in the nature of an attack, as I was accused of last night, but of direct replies to the teachings which have been laid down in the paper and discussion.

First, the essayist has criticized the teachings of the new school of orthodontia in regard to the early regulation of teeth. He leaves the impression that it would be a great deal better to wait until the patient was older before beginning regulation. His claims for such an assumption are not clearly stated, but he refers to the fact that a great many people have regular teeth, and that these have not been regulated. At the present time I do not believe that there are very many people whose teeth do not need regulating. Even admitting that there is a greater number of normal occlusions than I believe really exist, there is no reason to believe that irregularities existed in those teeth when the patient was young. I would like to know by what untold process or force teeth that are overlapping and crowded can ever become straight without aid. Every observer has seen cases of extreme malocclusion which had their beginning in one rotated lower incisor. Furthermore, it has never been noted that any such case assumed a normal occlusion. We recognize certain forces which we term "forces of occlusion" that are necessary in order that a perfect denture may develop, and one of these forces is the normal approximal contact point. Without a normal approximal contact point, which we do not find in young children when the teeth are crowded or rotated, a normal occlusion is an impossibility.

In listening to the essay it seemed to me that some of the statements made would have been omitted had there been a proper understanding of the forces of occlusion and of normal occlusion as a whole. For instance, there seems to be a certain question in the essayist's mind as to whether Dr. Angle's classification is the proper one. The essayist consented to use it only because it had been so universally adopted. Why was it universally adopted? Because it is based on normal occlusion, which should be the basis of dentistry. Still, in referring to class I cases, the essayist spoke of the buccal teeth being in normal occlusion, which leads me to believe that he has a poor understanding of this classification or of normal occlusion. In class I cases the "buccal teeth" are very seldom in normal occlusion, which fact would cause a different interpretation of some of the cases spoken of today.

A great amount of time was consumed in discussing the question of inheritance, particularly in trying to prove that malocclusions which were the result of inheritance could not be treated without extraction. No biological facts were stated which would prove to me that malocclusions could be inherited or produced by mixing of types. I now want to call to your minds how inconsistent the essayist is in his paper. He tries to prove that cases are the result of inheritance or inherent tendencies, and that such cases cannot be successfully treated without extraction. In another portion of the paper, however, he describes a case which he claims to be the direct result of inheritance, and which he would treat without extraction. I would therefore like to inquire why, if it is possible to treat one case, claimed to be the result of inheritance, without extraction, it is not possible to so treat the others? I am greatly confused on that point.

Several years ago there was a great amount of discussion as to the question of the inheritance of acquired characteristics. These discussions were participated in by men who could be placed in two classes, namely, those who based their arguments on what they thought they saw, and those who by investigation and research furnished proofs, regardless of their possible effect on former theories.

The question of inheritance is one about which the public has fixed ideas. Does not the Bible state that the sins of the parents will be visited upon the children? Many have thought that syphilis was one of the sins referred to, but now, it having been proved that syphilis is not inherited at all, contrary to the opinions still held by some, but that it is the direct result of an organism, therefore we find another pet theory exploded. But a short time ago tuberculosis was thought to be inherited; now it is proved that it is never inherited, and furthermore, that the tendency is not inherited—unless living in an infected house be the result of inheritance. I only cite these facts to show how greatly opinions have changed of late years on the question of inheritance. We formerly thought that mental characteristics were inherited, and if a minister's son became a bank robber, he was a black sheep, and if a pickpocket's son became a respected citizen, it was a special dispensation of Providence. It has been proved that both these unexpected results are the outcome of environment for which parentage or inheritance are not responsible. As to environment, it has been shown in this city and at this meeting that the mental disposition of the child is not the result of inherited characteristics, but of a carious tooth.

By inheritance we understand that the offspring will resemble the species. A chicken-egg will produce a chicken and a duck-egg a duck. The offspring may resemble one or both parents, a fact which the essayist and Dr. Cryer seem to have misinterpreted and applied to the production of malocclusions. It is a well-established fact that only those characteristics which are impressed upon the germ cell can be inherited. Nature cares little for the individual, but looks after the species. Variations are constantly arising, and those which arise suddenly are transmitted, providing they are beneficial to the species. If they are not, those of the species which possess them will be lost in the race of life. Malocclusions which are acquired do not arise suddenly, and are not transmitted, because there has never been a logical explanation given of how they could be impressed on the germ cell, thus eliminating a large number of conditions.

The issue at present, according to the paper to which we have listened, seems to be that by the intermarriage of different races or types malocclusions are produced. Dr. Cryer seems to hold a similar opinion, according to his discussion. There is a great amount of evidence in regard to what occurs in the breeding of lower animals, but we do not find any such conditions occurring, as some would have us believe, that could cause malocclusions to be inherited. In the breeding of different types we find the offspring may resemble one of the parents to the exclusion of the other. As a result of this, biologists speak of a predominating and a latent type. Some species have greater predominating characteristics than others. One example is the Hereford cattle. The offspring always resembles the Hereford, and does not revert as in some other cases. In crossing the black and the white races, each of the characteristics will be present. If the crossing is continued farther with the white race, we will reach a point where the offspring will resemble a full-blood white, but unfortunately, in the next generation the offspring may have decided characteristics of the black race. The characteristics, therefore, that are predominating in one generation may become latent in the next, only to re-occur in the following. If this is true, you may ask, why could that not account for malocclusion? Dr. Cryer thinks it can and to prove the wonderful influence of heredity he cites the improvement in the hog, showing a prizewinner of long ago and one of a more modern time. But there is another side to this question, namely, the influence of environment and careful selection. If the prizewinner were forced to fight for existence, as his ancestors did, he would not last long, and the offspring in a few generations would resemble the wild hog from which he originally came. The wonderful effect of inheritance would give way to the effect of environment. The converts to the wonderful influence of inheritance as a causative factor of all sorts of ridiculous things, malocclusion especially, also like to refer to the record of the American trotter, which again has been produced as a result of careful selection. It may surprise you to learn that the full brothers of the champion trotters often spend their lives pulling a dray-wagon. One colt may be developed into a prizewinner and the other into a dub. Thus inheritance in the racehorse accounts for not more than 50 per cent. of the result; the rest is careful training or environment. Do we not see one boy of a family develop into a great athlete, while his brothers are not able to "flag a bread-wagon?" Therefore I claim that the record of the racehorse proves nothing except what careful training and selection may do. Leave the training out, and in a few years the horse will be where he started from.

Dr. Cryer also likes to cite the bulldog, which is another example of careful selection aided by pathological conditions which develop early in life. Every prizewinning, short-nosed, pug-faced bulldog is a mouth-breather. It is a fact that conditions which arise suddenly may be transmitted, and the bulldog is a result thereof. He is deformed in several parts of his body, and in the struggle for existence would not last for any length of time. The deformity of the face caused him to be a mouth-breather, and mouth-breathing aids in the development of a type of malocclusion that is found in people with similar pathological conditions. Again, the prizewinner is often the direct result of mechanical interference in the development of the face. A great many breeders place pressure on the region of the nose of young puppies, the maxillæ thereby being prevented from developing, and by exerting a forward pressure on the mandible, it is caused to over-develop. Furthermore, that type is very poorly established, for if the prizewinner, male or female, breeds with any other type, the bulldog type is lost in the first generation.

In speaking of the mixing of races or types, I must call your attention to the skull of an individual of white and black mixture shown by Dr. Cryer. The excessive protrusion which was exhibited in this illustration, Dr. Cryer claims to be the result of the inheritance of the jaws of the black on the cranium of the white parent. If the posterior portion of the skull had been shown, I have little doubt that just as great a protrusion would have been noted in the region of the occipital bone as there was in front. In other words, that skull was a type of its own. Moreover, the teeth were in positions of decided malocclusion, which would cause abnormal development of the bones of the face. Again, the skull showed every evidence of rickets, which would cause abnormal development. Therefore I think Dr. Cryer misinterpreted what he really saw.

How would it be possible for the child to inherit the jaws of the black race and the cranium of the white ancestor? After the union of male and female microzoöns, during the process of segmentation and afterward, the cells which develop are the result of the fertilization of the female cells. No cells can be said to be black cells or white cells. Each set of cells possesses characteristics of each parent. If that be true—and I believe Dr. Cryer will admit it to be—how could there be a development of the jaws that would be distinctly black, and of a cranium that would be distinctly white. It is a further fact in the development of the embryo that a portion of the jaws is developed from the outgrowth of the cranium. I refer to the fronto-nasal process. From an embryological standpoint, therefore, the condition which Dr. Cryer thinks he has found is an impossibility.

This brings us to the consideration of conditions which were mentioned by the essayist. We were led to believe that in some cases the mandible possessed the characteristics of one parent and that the maxillæ were derived from the other. The under-developed mandibles which we find in class II, division 1, are such conditions as the essayist referred to in his paper; also, class III might be caused from the inheritance of a large mandible in a cranium and maxilla obtained from a smaller parent. Dr. Case evidently thinks that he has seen such conditions, according to the arguments advanced in his paper. He does not tell us by what process of development such inharmonious conditions can be caused, therefore I am not ready to believe that they ever do occur. Again, I believe certain investigators have been mistaken, as they were in times past when they thought that tuberculosis was inherited. Clinical facts unproved by other findings are given little weight in this day and age of the world, even when stated by the best men of the profession. Again, from an embryological point, it is impossible for a child to inherit the mandible of one parent and the jaws of the other. The first evidence we have of the beginning development of the jaws is when the branchial arches begin to form. In the region of the neck near the end of the fore-gut we first notice a ridge in the mesoderm on the right and left sides. At this same period an active growth occurs in the region of the cranium, which results in an outgrowth from that region known as the fronto-nasal bud. From the first branchial arch, which has also increased rapidly, a bud is then developed on the superior surface, and at this time it is convenient to speak of the first branchial arch as the mandibular arch. The bud on the superior surface of the mandibular arch is what later develops into the maxilla. The mandible and maxilla, therefore, are both derived from the same source. The premaxillaries are derived from the fronto-nasal bud, but they make up but a small part of the upper arch as compared to the maxilla proper. How, then, can the child inherit the mandible of one parent and the maxilla of the other?

The child may resemble either one or the other of the parents or be a blending of both, partaking of the characteristics of both. If it did partake of the characteristics of both, every part of the structure would be harmoniously constructed. We would not expect to see the right ear of one parent and the left ear of the other. Did you ever see the hand of the father on the arm of the mother? In the study of hybrids we do not find any such conditions as some men claim to have noted in their patients. The mule partakes of the characteristics of both ancestors, but does not develop the legs of the horse and the body of the ass. Neither does he have the hind legs of the horse and the front legs of the ass. Still, in the face of all these facts, we are constantly hearing false statements such as we have heard today.

In speaking of the inheritance of large teeth in small arches, I will be as brief as possible. If large teeth are inherited in small arches, why do we not find an equal number of small teeth in large arches? If such conditions are inherited, why do they not make their appearance in the deciduous teeth? We never have any such cases presented until after the permanent teeth are erupting and the child has been influenced by acquired conditions and environment for a number of years. Again, in the study of the development of the teeth and jaws, we find that the same kind of cells that enter into the formation of the arch also form the tooth, with the exception of the enamel. In the mesoblastic tissue from which the teeth and jaws are developed, it cannot be determined which cells will form the teeth and which ones will form the jaws. A type of tooth is designed to suit a jaw of certain size, and unless some acquired cause arise, barring congenital defects, normal occlusion will be established. If a child were put together like an automobile, nature might get the parts mixed up, but fortunately the individual develops as the result of the union of two germ cells which blend and form an harmonious type.

Dr. Case refers to cases which we know as class II, divisions 1 and 2, and says that he cannot comprehend why, if adenoids and mouth-breathing are responsible for one form of irregularity, we would note such a difference in the other —or words to that effect. I may not have quoted him correctly, but judging from his arguments that seems to be one point of contention. He also says that he does not see how it would be possible in cases of mouth-breathing that the lower teeth be held distally and such an under-development of the mandible be produced without the upper teeth and maxilla being developed forward. First, I wish to state that mouth-breathing is only one of the evils that are present in those cases. It is long-continued mouth-breathing with its concomitant evils that produces irregularities of class II, division 1, with the narrow upper arch, protruding upper incisors, distal relation of the lower teeth, and under-developed mandible. Those conditions are produced because certain forces of occlusion are disturbed. In cases of class II, division 2, there is a distal relation of the lower teeth, but the mandible is developed because forces of occlusion are normal in this case that are abnormal in the former. On this one question alone a paper could be written which would even be longer than the one we have listened to.

In the treatment of cases of classes II and III Dr. Case admits that teeth can be moved distally. A few years ago he would not admit that. Possibly in a few more years he will admit that malocclusions are not inherited. However, he raises the old contention that in the movement of teeth distally, the teeth distal to the ones that are being moved will be impacted, referring to impaction of second and third molars. Dr. Cryer a few years ago raised that question, and since that time several hundred molars have been moved distally and no impactions have resulted. If a case of impaction should result, it would prove nothing, for we know that hundreds of impacted molars are observed every year in patients whose teeth have never been regulated. Furthermore, as Dr. Case stated, one X ray was made after the teeth were moved distally, and the seemingly impacted tooth came into proper occlusion. Such evidence should prove something, yet to Dr. Case it proves nothing,

As to the question of bone growth, upon which the essayist has written so many pages, he sees fit to doubt the statement that bone develops as the result of mechanical stimulation. He says that there are no conclusive biological proofs therefor, while in reality all of the biological facts go to prove it. If bone does not develop as the result of mechanical stimulation, how does it develop? What has been responsible for the formation of the exo-skeleton and the endoskeleton except mechanical stimulation? In the study of the development of animals, from the single-cell animal with no skeleton or osseous structure, to the multicellular animal with complicated structure, we find evidence of mechanical stimulation throughout; also in the development of the multi-cusped tooth from the single-cusped tooth, mechanical stimulation resulting from use has been at work throughout. The development of the bone supporting the teeth has been brought about as a result of mechanical stimulation through the use of the tooth. If force which is the result of natural conditions causes the development of bone, it is logical to expect that artificial force properly applied will produce the same effect. We have found this to be the case. Every day arches are being developed as the result of mechanical force, mandibles are being induced to grow, and results are being accomplished that would be impossible without the growth of bone. Dr. Case practically admits that if bone can be made to grow, extraction would not be necessary, and in the practice of a large number of practitioners it is not necessary. Much evidence could be produced proving that bone develops as the result of mechanical stimulation, and I note that Dr. Cryer has played safe by saying that he may change his mind later on, and I know he will, and I hope the same of Dr. Case.

Dr. HINMAN. I would like to ask Dr. Dewey what he does in bimaxillary protrusions. Dr. Case showed us his manner of procedure.

Dr. DEWEY. As I said before, certain features of this paper have appeared to me as a joke. Bimaxillary protrusions are a joke. Dr. Case has set up a standard of beauty, and beauty is something that cannot be defined. The standards of beauty are different according to type. In the negro race the "bimaxillary" protrusions exist, and are normal for that type. There are different types of races, as there are different types of dogs. One might as well say that the greyhound has bimaxillary protrusion because he is not like the bulldog, as to say that the negro has bimaxillary protrusion because he is not like the white man.

Dr. HINMAN. I want to know how you would regulate a case of apparent bimaxillary protrusion. Would you extract?

Dr. DEWEY. No, I would not. In the cases which the essayist has exhibited as representing bimaxillary protrusion, he has unfortunately shown only the profile and not the front view. But he has made the statement that the buccal teeth were in normal occlusion. They were not, however, in normal occlusion in the model that was passed around. Furthermore, the normal mesio-distal locking of the molars is not sufficient to establish normal occlusion of the molars. In the majority of cases of class I we do not have normal occlusion. Furthermore, in those cases in which Dr. Case extracted the bicuspid, he has moved the molars forward. He will contend that he has not, but if you examine the models carefully you will see that the teeth have been moved forward, and in bringing forward these teeth the lower teeth have been "pushed" forward by the stimulation of the growth in the mandible.

Dr. H. C. **Ferris**, New York, N. Y. It is evident from the import of Dr. Case's paper that a defense of his theory which he has taught and practiced for a number of years is necessary.

FIG. 1.

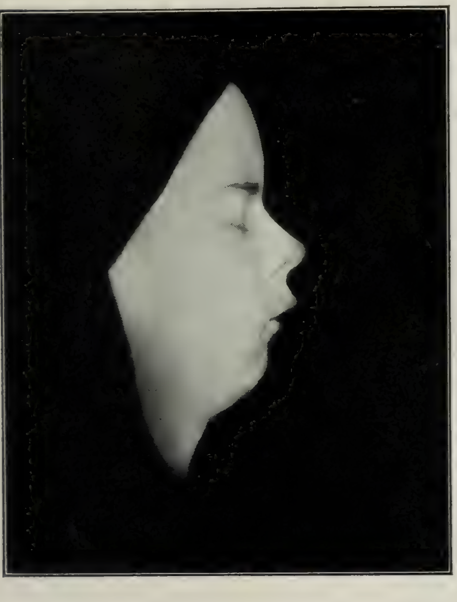
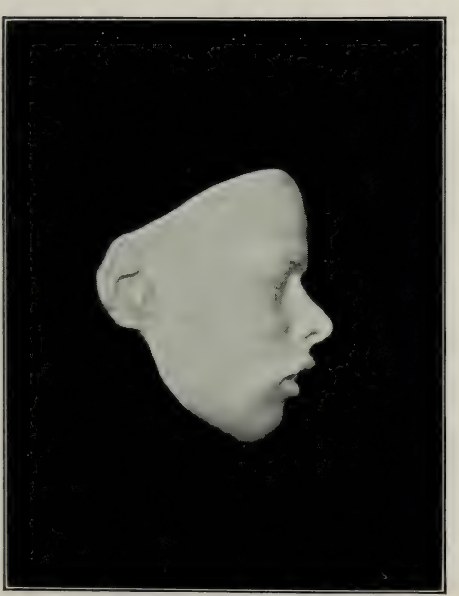


FIG. 3.



It is science, for the good of humanity, that brings us here. Therefore, while I hold the essayist in high esteem and fully recognize his ability and sincerity, for scientific reasons I do not believe in the principle which he emphasizes in his paper.

FIG. 2.

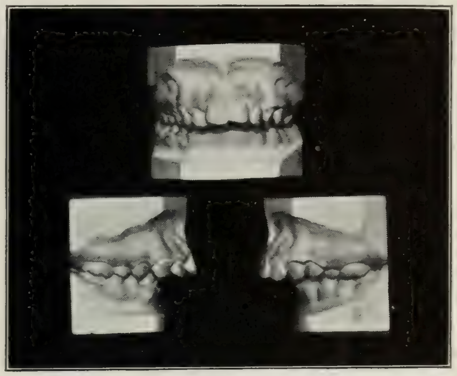
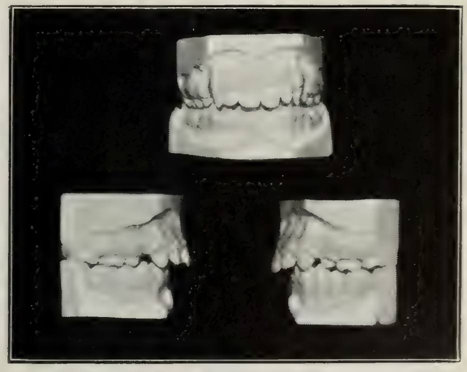


FIG. 4.



His standard undoubtedly is the facial line, according to his idea of beauty, for which there is no rule, except in his own mind's eye. If we could develop our cases into the Apollo type as a standard, with the upper lip at an angle of 45° to the nose, the result would not be pleasing, as many of these faces would be out of balance with the whole head.

Careful observation will prove that nature does do all that Dr. Case says it does not do. It harmonizes all the anatomical parts, even to the color of the hair and the teeth, as well as their form in all types.

Fig. 5.

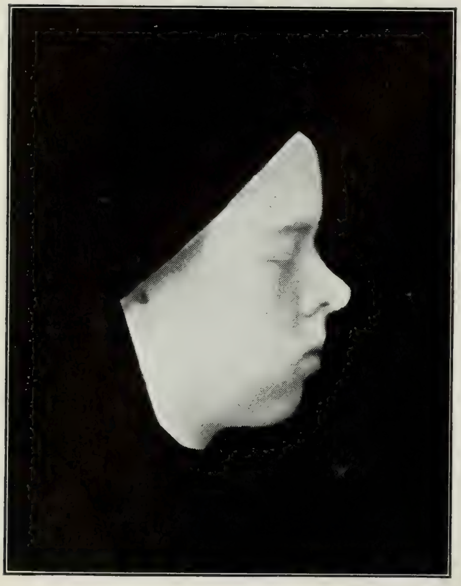


Fig. 6.

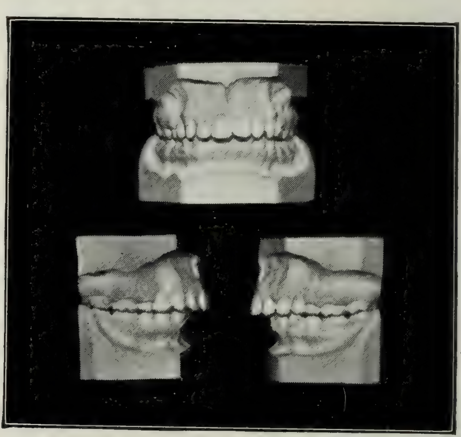
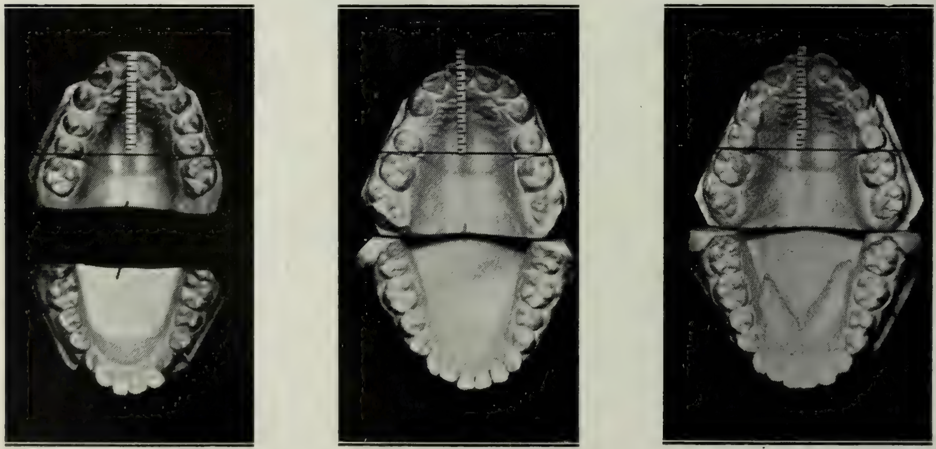


Fig. 7.

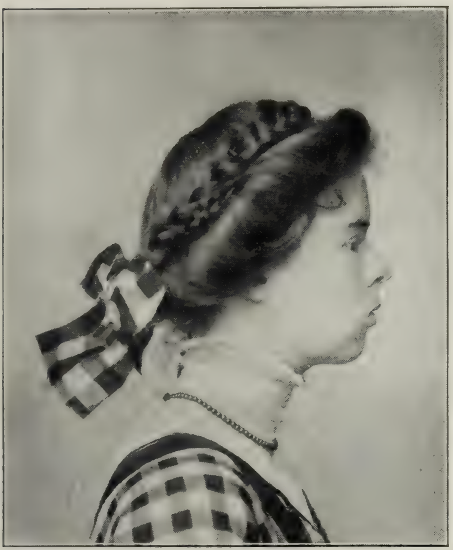


We appreciate that a blue artificial tooth in the mouth of a patient of bilious temperament or a brunette with bleached hair is detected at first glance; likewise a tooth with the length predominating over the breadth in the mouth of a patient of nervous temperament is immediately declared artificial by the laity.

These illustrations simply portray how harmonious are the properties in the development of any type, and the lesson to be derived is that nature is the best judge, provided we assist her when she is hampered, or when her developmental forces are operating adversely.

To illustrate this point, one cannot imagine anything more ridiculous than the correction of one of the extreme types as illustrated by the portrait of Savonarola. If, after the principles expressed by Dr. Case, one were to try to convert this type to a given standard of beauty and bring the chin forward to the Apollo type, the resultant artistic injury is readily seen; or if an upper premolar on one side were extracted, what looks to Dr. Case like a double protrusion at sixteen years of age would result in a depression of the lips, and would throw the features out of harmony with the whole head at maturity.

FIG. 8.



Two years after completion. Note how nature is taking care of the thick lips.

Dr. Case acknowledges that Dr. E. H. Angle's classification has been accepted by the majority, which would appear to be a verdict against his recommendations. I have lived long enough to have practiced the essayist's methods of extracting the first premolars in cases of class II, division 1, and to see these patients grow to maturity. Likewise I have treated cases of the same class upon the principles set forth by Dr. Edward H. Angle's teachings. I have had the uncomfortable experience of having to undo a case started after Dr. Case's method, and having to introduce artificial teeth to fill the space that had partially closed, and would court the opportunity to operate

FIG. 9.

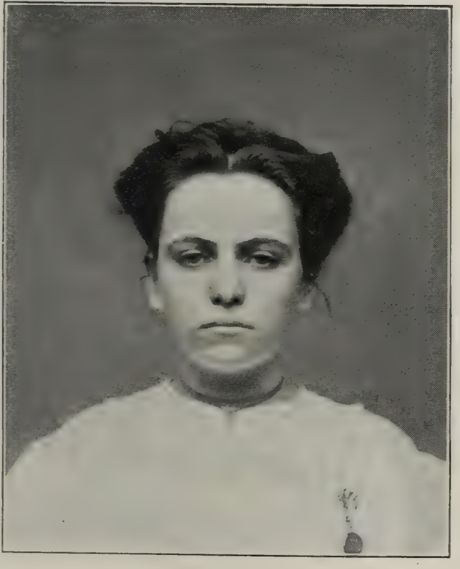
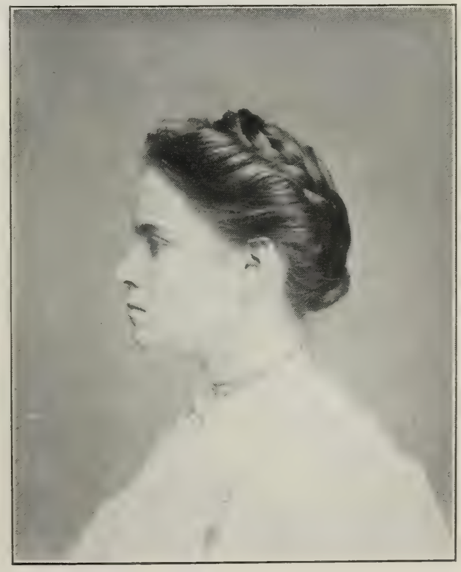


FIG. 10.



on many others in a like manner. In the following illustrations such a case is demonstrated.

FIG. 11.

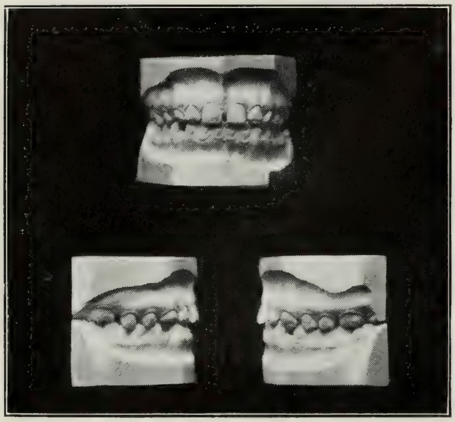


Fig. 1 represents a mask picture of the case, taken by flashlight.

Fig. 2 shows the original model. Fig. 3 is a picture of a plaster mask taken after one year's treatment after Dr. Case's method. Fig. 4 shows the model after one year's treatment.

FIG. 13.

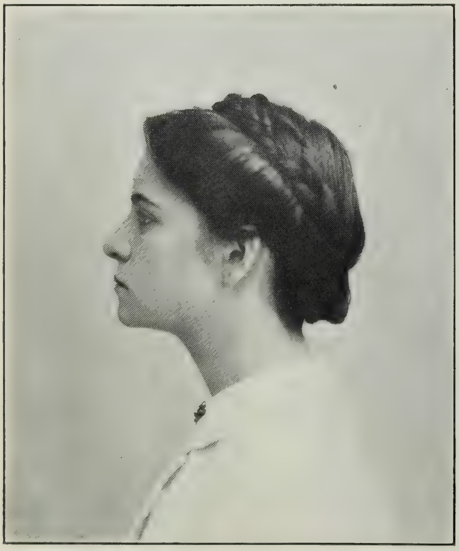


Fig. 5 is a mask picture of the patient's face taken after two years' treatment.

FIG. 12.

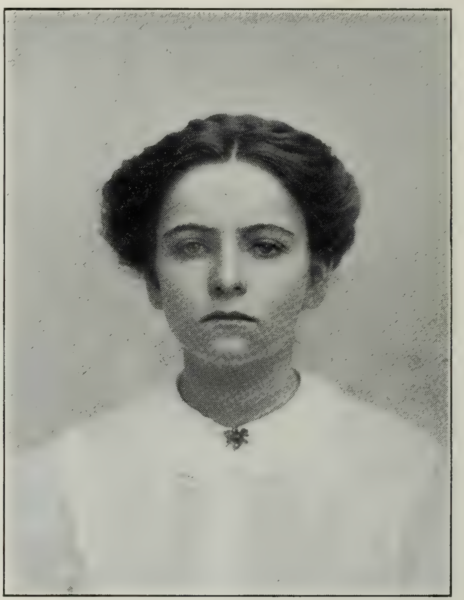


FIG. 14.

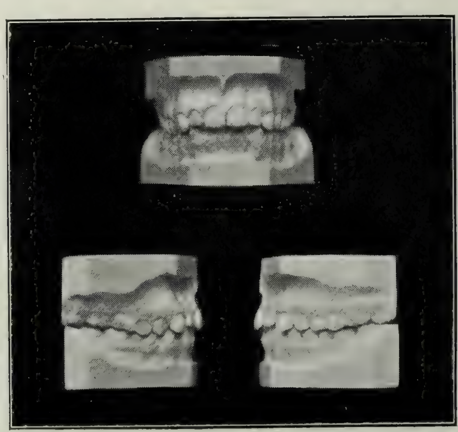


Fig. 6 shows the finished model after inserting artificial teeth in place of the premolars extracted.

Fig. 8 shows the case two years after completion. It will be noted that the so-called double protrusion disappears as the muscles of the face uniformly develop, operating in their normal position.

The viewpoint of the new school seems to be greatly at variance with Dr. Case's viewpoint.

The denture is a voluntary organ, composed of thirty-two digits and one hundred and thirty-four inclined planes in contact and normal occlusion. In my opinion, based upon a careful study of physiology, each tooth has a function to perform, and nature has provided that they be constructed of the highest organized matter in the human body to fulfil their purpose. The denture is not a rib which holds up the muscles of the face, and we are not beauty artists, but rather protectors of the first three inches of the alimentary canal. Our aim should be the restoration of nature's mechanical crushing organ, according to her plan to establish the highest physiological value in this organ. The effect of the loss of one or two teeth, representing a loss of twenty-four out of fifty-six meat-reducing inclined planes, which have a decided stimulating effect upon the flow of mucin in the salivary secretion, is proved in this year's report of the Committee on Scientific Research.

FIG. 15.

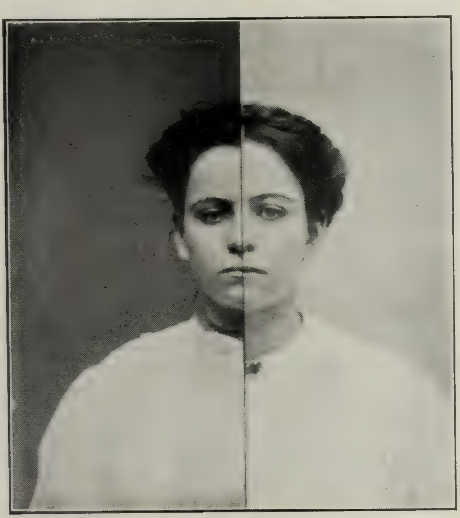
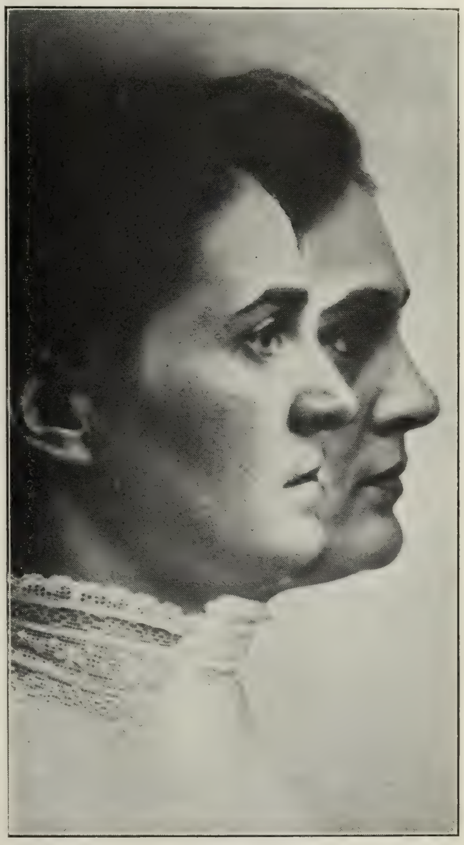


FIG. 16.



Furthermore, the findings of Dr. Michel of Würzburg,* Germany—published in the COSMOS in the report submitted by me as Correspondent of the New York State Dental Society—who together with two other investigators has carried out a series of experiments as to the effects of missing bicuspids and molars upon the digestion of meat and starch as found in the feces, proves that the absence of the bicuspids produced an increase of the undigested starch products in the excretion of the body. In view of the findings of Dr. Lawrence Baker of Boston, in experiments on rabbits, in which the jaws, skull, and ribs were undeveloped on the side where the teeth were removed, and an interference of function occurred robbing the developing bones of their normal stimuli for development, it would seem that the operator would think twice before recommending any mutilation that would interfere with the functions of the delicate mechanism, provided that the teeth can be returned to their normal position by some other method.

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* See COSMOS for November 1910, page 1272.

Fig. 17.

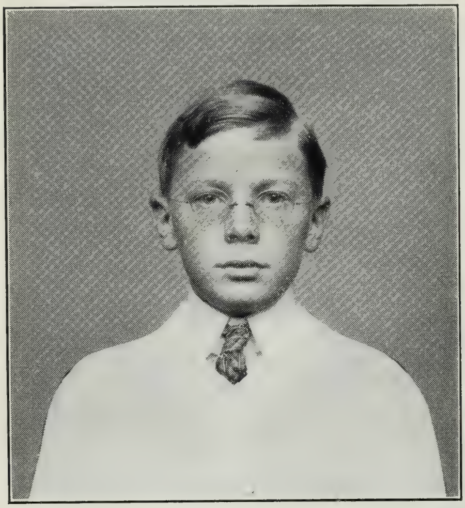


Fig. 18.

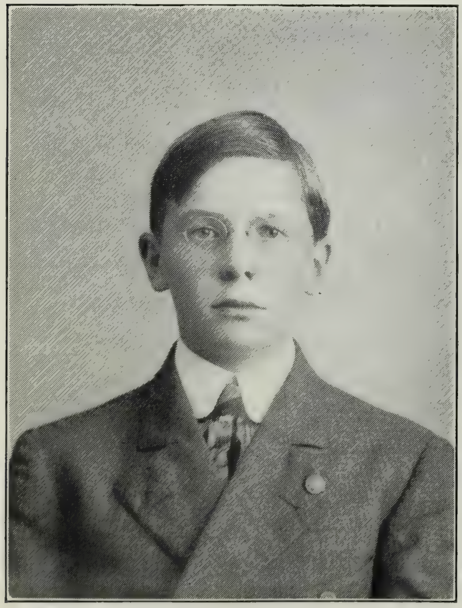
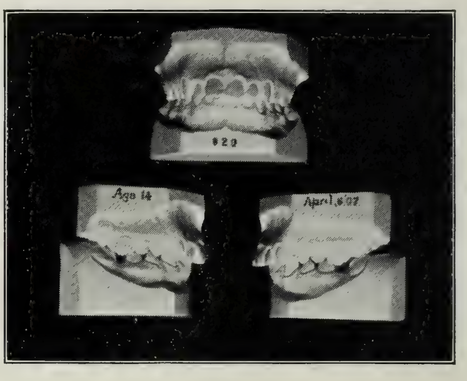
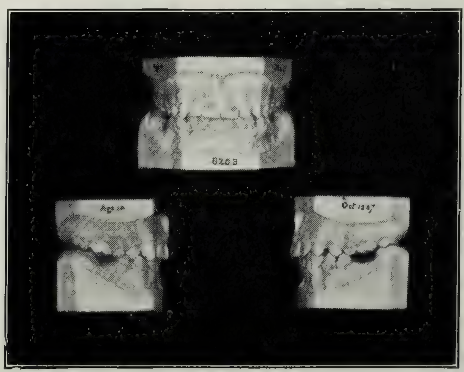


Fig. 19.



There are exceptional cases which demand exceptional treatment, but that 20 per cent. of this class of cases in the essayist's practice demand extraction seems to me extraordinary. That the greatest beauty of a type is attained by the normal occlusion of all the teeth has been proved true in the majority of cases which I have treated; also that the expressions of the face, which demand that all the muscles shall act in harmony to express the feelings of the subject, are influenced by the position of the mandible in relation to the whole head.

Fig. 20.



It has been accepted by a large majority of investigators that the mandible is influenced by muscle stress, when exerted normally or when stimulated artificially. Dr. Martin Dewey's treatise, offered a year ago before this body, goes farther to show how normal function or excessive stress will influence the shaping of the entire cranium.

On the last page of his paper the essayist acknowledges surprise at the abnormal development of the nose of one of his patients within three years. It would appear that his principle of treatment was based upon very unsafe grounds, when he assumes the ability to mentally paint the unfinished picture of his developing subject and to develop a new type. Many artists have attempted as a pastime to portray this development, but have never dared publicly to exhibit the picture of adult life painted after a youthful subject.

In the following I would show three records of cases in which teeth have been returned partially to their normal position in relation to the whole head, after the principle of the full complement of teeth in normal occlusion. In each of these cases it will be noted that the lips become thinner as the osseous parts are carried mesially from the middle line of the head to fill their normal positions. All the expressions of the face—the eyes, nose, and mouth—are distinctly modified and softened. (See Figs. 9 to 14.)

The illustrations in Figs. 15 to 18 show the results of a correction in a case of Class III, division 1, without extraction.

The illustrations in Figs. 19 and 20 demonstrate another correction of a case of class II, division 1, Angle's classification, which was accomplished in six months without extraction of the first premolars.

In conclusion, I would state that in my experience not more than one case in five hundred necessitates extraction of the premolars to accomplish the best results.

Dr. J. P. Buckley, Chicago, Ill. It is to be regretted, though not strange perhaps, that there seems to be such a variance of opinion among scientists as to the methods of correcting irregularities of the teeth. A wide difference of opinion exists among the so-called new and old school of orthodontists—these distinguishing terms being terms which I do not like, and which I do not believe are expressive of the actual conditions that exist, but which nevertheless are used to designate two groups of practitioners, *i.e.* the one comprising those who extract and the other those who do not extract teeth in the correction of irregularities of the teeth. It is not strange that honest, conscientious, and scientific investigators should differ as to methods of correcting these conditions when their methods are based by both groups upon the *causes* of these conditions. In order to study the causes of the irregularities which occur so frequently in the human mouth, we are led into the study of biology and allied sciences, and the fact that man himself and all the life processes pertaining to the development of the human individual are involved in these studies renders them exceedingly difficult. While this is to be regretted, though not strange, yet it seems to the casual observer, and even to those who have observed with more than a casual glance the remarkable progress made in the last few years in orthodontia, that more jealousy, prejudice, and personalities, not to mention ridicule, have been indulged in between the followers of Dr. Case on the one hand and the followers of Dr. Angle on the other than there is any excuse for. I wish that these two groups of practitioners could come to an agreement, whereby, I believe, they would advance that branch of dentistry even more than they have done in the past; this, however, seems almost more than we can expect or hope for.

Dr. G. F. Bowman, Pittsburgh, Pa. Dr. Case in his paper seemed to advise against the early expansion of the deciduous arches, especially when the lower incisors are erupting in slight malocclusion or slightly out of alignment, because nature would correct these irregularities. If that be true we wish to have this statement confirmed, because, if so, we have been doing a great deal of injury in expanding arches. If nature will really correct these irregularities, I would have Dr. Case explain to us why teeth are rarely observed to be in perfectly normal occlusion, while it is exceedingly common to see them in malocclusion.

Dr. Case (closing the discussion). In answer to the last speaker, I may say that one reason why he sees so many more cases of malocclusion than he did formerly is that he is now an orthodontist, and naturally is far more observing.

I shall not detain you long because I realize that you are already tired out with this lengthy paper and its discussion. Nor has there arisen any material evidence in the discussion, as far as I have been able to observe, in opposition to the claims of the paper which is not fully answered in the paper itself, except certain unwarranted and false statements and inferences in regard to my teachings and methods which I do not have the time or disposition to even notice.

I must say that I am somewhat surprised at the tame effort at a rebuttal of my attack upon the bone-growing fallacy. I supposed that at least an attempt would be made to show that no claim had been made that bones could be artificially stimulated to grow *beyond* their inherent sizes. I therefore prepared myself to show by quotations from different writers that I had not overstated the facts. Since no denial has been made, we may take it for granted that such was really the belief of those who advanced that theory, which now certainly must fall before evidences of organic evolution.

I repeatedly said in my paper that bone may be stimulated to renewed growth. For years that has been one of the acknowledged accomplishments of orthopedic surgery, for which no special proof is required. My claim is that an interstitial growth of bone, whether from artificial stimuli or otherwise, cannot be induced beyond the inherent size of the bone.

In the stimulation brought about by the correction of malocclusions, dormant activities may at times be revivified, and stunted development stimulated to renewed growth up to full inherent size. If the upper denture is protruded in relation to esthetic facial lines, and the lower teeth and mandible are retruded in relation to the upper, though otherwise they be normal, the placing of the teeth in normal occlusion by forcing the lower denture forward will not cause the mandible to grow to a harmonizing size unless that size was stamped upon the mandible by inheritance, and that which in all probability it would have assumed without interference.

It is not difficult to make a collection of lantern slides which show the deleterious effects of extraction in Dr. Angle's class II. It is also possible for anyone exhibiting these pictures to claim or to infer that such is the kind of practice that I teach or that is practiced in "rational" orthodontia. Whereas, in truth, I would pronounce every one of these cases of extraction to be malpractice, notwithstanding the possible fact that the upper teeth were protruding far beyond normal occlusion with the lowers.

PENNSYLVANIA STATE DENTAL SOCIETY.

Forty-third Annual Meeting, Scranton, Pa., June 27, 28, and 29, 1911.

(Continued from page 97.)

THE CLINICS.

Dr. G. T. Gregg, Pittsburgh. "Excavating Sensitive Dentin by the Aid of Nitrous Oxid and Oxygen."

This clinic consisted in excavating a labial cavity in a lower canine with the aid of nitrous oxid and oxygen. The patient was a young man of about nineteen years of age. The cavity was painlessly excavated while the patient was in the analgesic state, and conscious enough to answer questions put to him by those surrounding the chair. The gases were administered through the Gregg inhaler, as shown in the accompanying illustration.

Fig. 1.

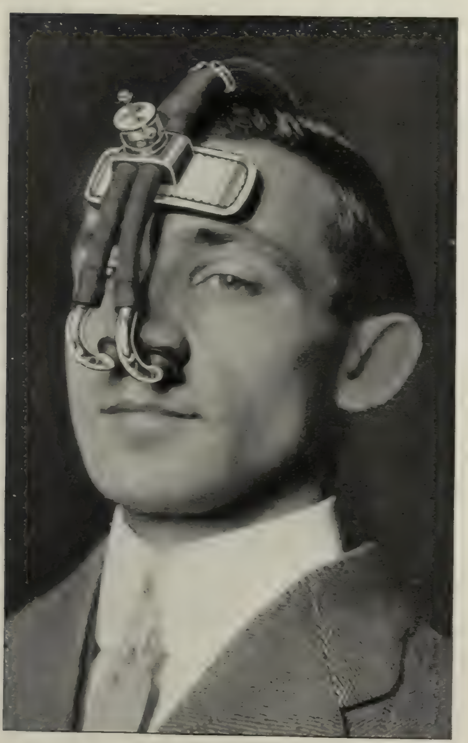
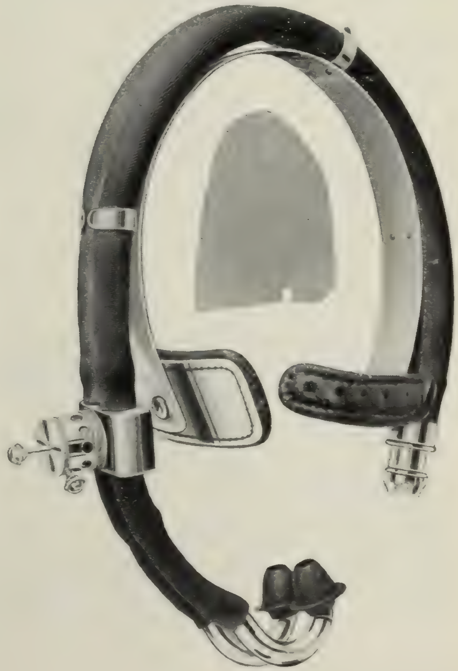


Fig. 2.



Dr. S. B. Luckie, Chester. "Method of Using the Tooth-brush to Get the Best Prophylactic Effect."

The brush should be of such size as to allow it easily to pass between the tuberosity of the maxillary arch and the ramus of the mandible. This requires in many cases as narrow a brush as can be selected. The brush is placed upon the gums of the right side with the bristles directed upward (see Fig. 1), so as to remove the accumulations of food débris from within the fold formed by the cheek, then passed back over the tuberosity and distal surface of the posterior tooth. Then the brush is turned so that the ends of the bristles point toward the cheeks, and by a rotary motion the cheeks are cleaned. This initial part of the cleaning should be performed on both sides of the mouth, above and below, after which the teeth should receive attention.

FIG. 1.

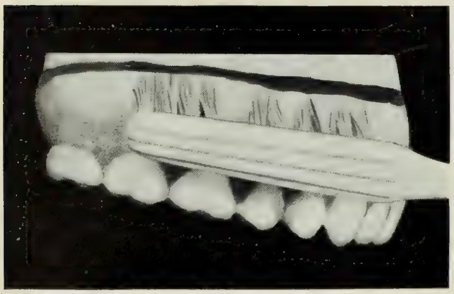
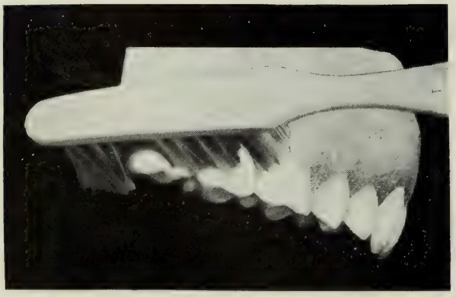
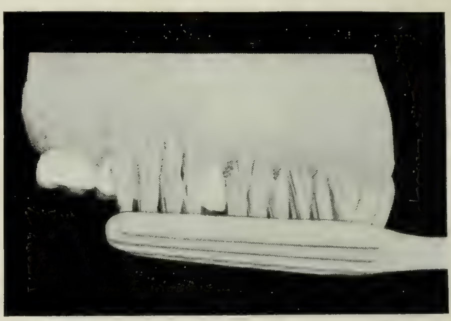


FIG. 3.



The bristles of the brush are placed upon the buccal cusps of the teeth (see Fig. 2) in such a manner and with sufficient force as to divide the bristles and to cause one portion of them to spread over the buccal and the other portion over the morsal surfaces. The bristles should reach the margin of the gums. Then with short strokes the bristles are induced to conform in their movement to the shapes of the crowns of the teeth, cleaning the surfaces to the contact point. Particular efforts should be made to reach the distal surfaces of the third molar, or the last tooth in the arch (see Fig. 3), as often at this point a corner is found favorable for the retention of food. The lingual surfaces should be treated in the same manner and with similar perseverance. These surfaces are often neglected, as is noticed in mouths that are otherwise clean.

FIG. 2.



This method of cleaning the mouth when demonstrated to patients impresses them with its effectiveness. The brush so used will show a marked wearing away of the central rows of bristles, showing it has adapted itself to the teeth.

Dr. E. R. SAUSSER, Philadelphia, "Porcelain Technique."

Dr. Sausser demonstrated, with the use of technic teeth, a simple and successful method of cavity preparation for porcelain inlays, also a systematic way of burnishing matrices in such cavities. To show how easily this work could be mastered by a little conscientious application and thorough understanding of the fundamental principles involved, the results attained by the average student in the porcelain department of the post-graduate school of the University of Pennsylvania were exhibited.

Dr. V. H. Jackson, New York. "Orthodontia and Orthopedia of the Face."

Dr. Jackson gave a clinic describing his system of orthodontia. His method of equalizing the dental arches was shown with models and appliances mounted on boxes arranged for describing the action of the apparatus in causing movement. He demonstrated how the apparatus could readily be removed from the teeth by the patient by unhooking wire clasps that were arranged to engage with lugs on gold collars cemented to the teeth for anchorage, known as the locking device.

About forty models with appliances were exhibited and described, showing the clinician's methods of expansion and contraction of the dental arches, moving incisors and other teeth outward, inward, and laterally, rotating, elevating, depressing the teeth, etc.

The clinician showed his original method of reducing orthodontia to an exact science by the use of what he terms a tracing card, with which he demonstrated that by making accurate and recorded measurements on an accurate tracing of the apparatus he could secure any amount of change in apparatus for producing the desired progressive force.

In this connection he also described how he designs and makes a permanent record of the apparatus, to be made and used for practical cases. This permanent record is brought about by the use of an improved carbon triplicating book. Three copies are made of the design of the apparatus to be constructed. One copy is used as instruction for the laboratory man, the other copies are retained for other purposes, including that of a permanent record.

Many other plans and descriptions of apparatus were presented and demonstrated, including the shaping of wires and the making of appliances.

Dr. J. O. McCall, Buffalo, N. Y. "Oral Prophylaxis and Pyorrhea."

This clinic consisted in a demonstration of the use of the C. M. Carr pyorrhea instruments in removing deposits of all kinds from the roots, and planing to perfect smoothness all tooth surfaces coming in contact with peridental or gum tissue. The application of medicaments to pyorrhea pockets was shown. Methods of polishing exposed root and crown surfaces were demonstrated, with the purpose of facilitating the cleaning of the teeth by the patient.

Dr. E. S. Filbert, Pottsville. "Card Index System for Indexing Contributions to the Dental Magazines."

In this table clinic a portable filing cabinet was shown containing a subdivided index of 240 subdivisions, and cards on which the subject headings are typewritten.

The articles contained in the index are taken from the following magazines: Dental Cosmos, *Dental Brief, Dental Digest, Items of Interest, Dental Review,* and *Dental Summary.* Each article is indexed under its principal subject, the name of the author and the magazine, the month and year of publication, and the page.

An indexed article appears as follows: "Pyorrhea Alveolaris in the Young," T. A. Guthrie, S/6/11/455.

As a means of ready reference, for the writing of a paper, or for information on any subject as viewed by many authors, such an index is invaluable.

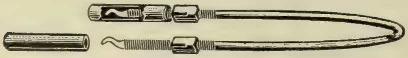
Dr. D. A. Rosenthal, Pittsburgh. "A Device for Facilitating the Perfect Adaptation of Backings and Soldering with the Least Possible Chance of Checking Facings."

The clinician's device consists of two wooden instruments, each with depressions for the retention of a rubber cork, one of which is more flexible than the other. By placing the tooth with the pins up on the softer cork, the top of which is concave, and pressing the backing into its place with the other instrument, the tooth is encased in a nest of gold, protecting it all around. The pins must not be bent before the tips are soldered—if tips are desired. The pins are run through a piece of rubber dam, and a steel instrument is inserted between the pins. The instrument is pushed forward while the pins are being bent, this action tending to prevent the direct application of force against the porcelain, which often causes a fracture before the case is even invested.

As an additional safeguard against checking, the facings before being invested may be painted with a composition consisting of equal parts of powdered asbestos and prepared chalk and a small quantity of plaster of Paris.

Dr. H. A. Pullen, Buffalo, N. Y. "Orthodontia."

The methods demonstrated for holding the expansion arch in the buccal tubes, and for preventing the nut on the arch from unturning were devised by the writer for the purpose of increasing the efficiency of the expansion arch. The plain nuts, as constructed by some manufacturers and used by some operators, easily unturn, and the action of the appliance is ineffective. The split nut, shown in the illustration, sprung on the arch overcomes this defect through friction, and renders the appliance more efficient.



The arch also often slips out of the buccal tubes, when the ligatures slip off, thus impairing the efficiency of the work done. To prevent this, small curved springs should be ground upon the ends of the expansion arch, as shown in the illustration. These springs, when properly bent, exert the necessary degree of pressure on the inner walls of the buccal tubes to prevent the expansion arch from being removed except by the operator.

Dr. W. R. Badger, Hubbard, Ohio. "The Badger Tooth."

Dr. F. M. Willis, Ithaca, N. Y. "Fusible Metal in Articulation."

This clinic showed the advantage of articulating or antagonizing artificial teeth and bridge work against fusible metal teeth, instead of plaster teeth such as are usually employed. The case shown was a lower partial plate of three posterior teeth on each side, to be articulated against a full upper set. The first bicuspids were devitalized and gold crowns fitted, on which clasps were adjusted to support the piece in the mouth. The bite was taken in the usual manner, except that a piece of fairly stiff iron wire—a portion of a hairpin—was embedded within the lingual portion of the wax base-plate, to prevent distortion during manipulation, and a narrow rim of wax extended from side to side in front of the remaining teeth to hold the base-plate securely in place while the bite was taken. A reproduction of the upper set in fusible metal was secured in the following manner: An upper impression tray was filled with plaster and the tips of the teeth, having been oiled, were pressed down into the plaster to about two-thirds of the length of the teeth. After the plaster had hardened the upper set was removed, and the impression poured out with fusible metal. The metal teeth were then removed from the plaster and placed in position in the wax bite on the model, and the case placed in the articulator. Ease, speed, and accuracy are claimed to be the advantages of this method.

To articulate an upper set of teeth, full or partial, with lower natural teeth, the bite is taken in the usual way, then a plaster impression of the tips of the lower teeth is taken with a tray which has been drilled full of holes to hold the plaster securely, the plaster impression is poured out with fusible metal, and the above procedure is followed.

By slightly varying this method, fusible metal teeth may be substituted in every case where plaster teeth have formerly been used in establishing the articulation, in plate, crown, and bridge work.

Dr. Thomas E. Weeks, Philadelphia. "Some Dowel and Hollow Metal Crowns, Showing Correct Principles in Construction."

The dowel crowns showed, first, the "cope" type of attachment or foundation, in which the dowel alone resists the stresses; second, the banded cap, in which the dowel is assisted in resisting the stresses by the band, and third, that type of dowel attachment in which some method other than the banded cap is employed to supplement the dowel in resisting the stresses to which the crown is subjected.

Emphasis was placed by the clinician on the superiority of those crowns which do not demand the removal of the enamel, also on the necessity for a perfect adaptation of the dowel to the enlarged canal.

In the superstructure, the correct method of adapting porcelain crowns of the detached-dowel type to either form of foundation was shown.

Several porcelain-faced metal crowns showed the correct grinding of the several types of flat-back facings and the proper construction of the metallic lingual surfaces protecting the porcelain against stress.

The swaged and soldered hollow metal crown illustrated a method of carving the cusp model and swaging the cusps in a counter-die, whereby accurate results are insured.

The cast hollow metal crown showed the accurate adaptation of the narrow band and the proper thinning of the wax model so that no more than the minimum of gold is required and correct contours are produced.

All of the dowel crowns were made by the casting process.

Dr. L. D. Coriell, Baltimore, Md. "Oral Prophylaxis and Pyorrhea."

The object of this clinic was to show the accuracy with which a root surface can be planed. The instruments used by the clinician are the Hartzell set.

Of principal importance in pyorrhea treatment is the removing of the circumferential lamellæ that have become pitted and entirely or partially necrosed, furnishing an ideal incubator for bacterial development. These planing instruments are so constructed that the cutting edge lies in a straight line with the center of the handle, so that the effect is really that of a straight instrument, though the shank may be decidedly crooked or curved in order to reach points not accessible otherwise.

The blades are sharpened at an angle of a little over ninety degrees by means of the sharpening device, each blade being sharpened at the same angle, thus insuring an even and regular cut, and preventing the operator from cutting into the lacunæ, which leaves the cells open to infection, or from cutting too deeply, which renders the tooth sensitive.

Dr. H. C. Register, Philadelphia. "The Taking of Impressions in Modeling Compound in Sections."

In demonstrating his method the clinician spoke as follows: The demonstration I have the pleasure of presenting before this society is the taking of an impression in modeling compound in sections, *i.e.* making the initial step of the impression perfect before we proceed farther.

The patient presents the unusual case of one of the smallest upper edentulous jaws that I have seen; this condition, however, if we succeed in our endeavor, will prove to you that the method I have the pleasure of demonstrating is far in advance of any other known. The patient tells me that he has never succeeded in having a serviceable plate made.

This system, I believe, was originally introduced by Dr. Green of Missouri.

The first part of this operation consists in selecting a tray as small as will comfortably pass over the ridge. In ordinary trays, either with flat or oval bottom, the rim should be cut away to about one-half its depth all around, extending across the palatal portion to the same width. In this way a much smaller tray is obtained than the impression is to be when complete. The mouth is sprayed with a slightly acid vegetable solution such as apple vinegar, followed by dilute alcohol in the atomizer, or the patient is requested to rinse the mouth with a slightly diluted mixture of the above-named solutions. The tray and mouth are then ready for taking the impression.

A piece of modeling compound—the Kerr Perfection being preferred—is softened, being of about the size of a hickory nut, or sufficient to spread over the hard palate under slight pressure, bordering upon but not covering the ridge from one condyle to the other. The modeling compound should be softened in water of from 190° to 200° F. The small piece is placed in the center of the tray, adapted to its position in the mouth, and very gentle pressure is exerted by holding the tray with the index and middle fingers on the edge, and the thumb guiding it from the outside, carrying it upward by gentle pressure. While holding it there for a minute, the pressure is increased very little, merely enough to insure contact. The hands are then withdrawn, and if the tray maintains itself in the position in which it was placed, it can be assumed that perfect contact has been obtained over the hard ridge.

It must be borne in mind that dental plates are held in position by adhesion and not by atmospheric pressure, and the object is to get an impression that will make a workable model but may not be a facsimile of the mouth. To secure adhesion, contact must be obtained over the mucous tissue, so that the pressure will be equalized over both the hard and soft tissues. Adhesion, in physics, is a term denoting the force by which different bodies remain attached to each other when brought in contact. This adhesion is brought about when perfect contact is made by the medium of a liquid filling all the air-spaces, this causing the plate to adhere. The principle is exactly the same as if two perfectly smooth pieces of glass are laid together; while no adhesion is obtained in the dry plates, the adhesion is very powerful if the surfaces are covered with water, thereby excluding the air-cells.

After the first contact of the impression has been obtained, dry modeling compound in the form of sticks is held over an alcohol or a Bunsen flame and melted. A moderate amount of this compound is melted along but not over the edge of one condyle, and built up as high as it will remain in the melted state. It is then placed in the mouth and held in position by the thumb and middle finger of one hand, while the middle finger of the other hand is used to press the soft compound around the condyle and up under the cheek. This process sometimes requires the addition of three or four more pieces, which while they are still soft are carried with the wet middle finger up to the reflection to soft tissues and the bone of the cheek. The opposite condyle is treated in the same manner. Subsequently both sides from the median line to the built-up portions are finished by adding softened compound, and gently carrying it into position as high up as possible.

The impression should now offer great resistance when it is drawn down from the mouth; indeed, if all the rules have been carefully carried out, it should be impossible to remove the impression except by allowing the air to pass in from the rear. The impression should then be chilled in cold water. With a sharp knife, the palatal portion between the condyles is cut down to the margin of the plate on the hard palate, care being taken not to disturb the condyle sections. The edge of the palatal portion thus trimmed is very gently warmed and softened over a small flame, a small quantity of compound is milled on to the edge, and while it is warm the impression is placed into position in the mouth, holding it with one hand, and with the wet middle finger of the opposite hand the softened edge of the compound is pressed gently against the palate. The impression is then removed, the edge of the rim is gently warmed one side at a time from the median line to the condyle, the impression replaced in position and held, and with the other hand the cheeks are pressed against it with some little force. The opposite side is treated in the same way.

Then both sides of the rim are carefully warmed, the impression is replaced and held in position with the finger, and the patient is requested to move his mouth and cheek muscles in every possible way. The palatal portion is then carefully warmed along its edge, placed into position, held with one finger on the roof of the tray, and the patient requested to swallow. This completes the taking of an impression for an upper edentulous jaw.

If there are any teeth remaining in the jaw and a partial plate is to be made, care must be exercised to cut away the plate freely, so that no part of it can come in contact with a tooth. This also applies to the modeling compound, for the impression must not be allowed to come in contact with the hard resistive surface of one or more teeth. After the impression has been perfected, the parts around the remaining teeth, one at a time, are shaped up by melting the compound to fit these spaces sufficiently to include the teeth perfectly.

The taking of an impression in the lower jaw should also be briefly described. Probably no effort in prosthetic practice is more exasperating to the dentist and patient than the successful construction of a lower denture which will allow the tongue to make its excursions during speech and mastication, will remain in position, and aid in perfecting speech.

If one or several teeth remain in the lower jaw, and they are worthy of conservation, they should by all means be retained, in the following way: The pulps are extirpated and the crowns cut off so that not more than one-sixteenth to one-eighth of an inch remains above the ridge, according to the case. After the root has been put in a sterile condition, the exposed part of the crown is capped with a gold ferrule cemented to place. This is all that is necessary when two or more roots remain in the lower jaw. If vulcanite is to be used, a telescoping cap is made for each crown, and left in the mouth while the impression is being taken, and removed with the impression. If two or more crowns of this character are used, care must be taken to make them parallel. If one or two anterior tooth-roots remain, a square lug is attached to the gold capped ferrule, made of gold or iridio-platinum square wire that will lie along the ridge of the gum, and is soldered to the cap. The under portion of these lugs, which comes in contact with the mucous membrane, must be made oval, so that all possible irritation may be avoided.

The taking of a lower impression, either with or without these retaining devices, is similar to that of the upper impression. The first impression is made in a tray that is cut relatively smaller than the jaw, as was done in taking the upper impression, and just sufficient compound is used to take in the ridge of the mandible and to overlap slightly on each side. The remainder of the impression is taken in sections, by adding sufficient molten compound along the edge from the medium line of the lingual portions and holding it while the wet finger carries it to position.

The three other sections are taken alternately in the same way. If this procedure has been carried out correctly, the completed impression should offer considerable resistance to the efforts at removal.

While the method described requires a little longer time to perfect the impression in the first part of the work, it is not only more agreeable to the patient, but offers greater certainty of a successful result, and, as a rule, much time is thereby saved in finishing and fitting the plates.

Since the success of all prosthetic work lies in the service which it renders to the patient, this method of insuring successful dentures should become the standard foundation for all prosthetic restorations.

Dr. C. C. Laubach, Scranton, Pa. "Treatment of Putrescent Pulps, Using Aromatic Sulfuric Acid and Sodium Bicarbonate."

This clinic consisted in the demonstration of the use of a ten per cent. solution of aromatic sulfuric acid for cleaning root-canals, and neutralizing the effect of the sulfuric acid by means of sodium bicarbonate.

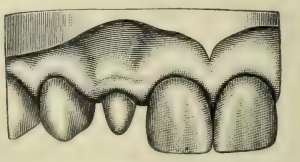
Dr. G. W. Cupit, Philadelphia. "A Case of Restoration of the Superior Maxillary Bone."

Dr. Cupit exhibited a case of restoration of the superior left maxillary bone and teeth by the insertion of an obturator made of rubber with a hollow cylindrical portion carrying the teeth of the left side, from the right central to the second molar inclusive. The patient for whom this obturator was made was a young man, who was eighteen years of age at the time of the original operation. The maxillary bone of the left side was lost by reason of a small round-cell sarcoma following an abscessed condition in the region of the upper left canine, resulting from a blow received in playful sparring. Dr. W. J. Roe removed the bone and the contained sarcoma in February 1910. Recovery was prompt, and the obturator was placed in position two weeks later. The contour of the face is restored to normal, and the external line of incision perfectly closed and almost invisible, there being no perforation of the outer surface of the lips and cheek. The articulation during speech is normal, and the patient eats and drinks normally.

Dr. W. A. Capon, Philadelphia, Pa. "Porcelain Crown—Platinum Frame—Porcelain Face."

This clinic consisted in a demonstration of the making of a shell crown faced with porcelain for a "peg" lateral, as shown in Fig. 1.

Fig. 1.

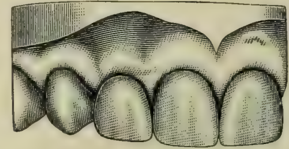


This crown is made by fitting a platinum band—gage No. 31—to a root or tooth prepared in the same way as for a gold cap, excepting that an overlapping joint instead of butting edges is provided. The lingual and labial outlines of the adjacent teeth are marked on the tube as a guide for grinding those portions away to gain shape instead of cutting with scissors. The lingual side is shaped with a wheel on a lathe, and a piece of platinum of the same gage is soldered to fit that portion with a very small amount of pure gold. After trimming and fitting to the root, the labial surface is ground thin enough to burnish and fit over the tooth, after which a thin veneer is fitted and held in position by the porcelain paste, carefully dried, and baked in the furnace.

The crown is then fitted to the root, and requirements such as proper size, shape, and thickness at the portions where porcelain is to be built up, are noted. If the surface of the veneer requires grinding, this should be done at this stage, so that the veneer will be glossed again by the last heat, which should be high and of uniform degree. After final baking the platinum portion is polished, and the crown is ready for inserting with thin cement and by gentle pressure. The crown should fit easily, as there is danger of breaking the thin porcelain on the sides of the crown or even of checking the veneer itself.

The joints are lapped and made as close as possible, so that frequent heating to a high temperature will not entirely destroy the solder; excess of solder will flow over the surface of the platinum, causing porosity and destroying the adhesion of the porcelain, which may not be noticed at the time of operation, but will become perceptible later on. The lingual surface is ground thin to give shape, so that there may be two flat surfaces to hold the solder. When finished, it insures the proper tooth contour, the appliance appearing as shown in Fig. 2.

Fig. 2.



Dr. O. B. Richards, Moosic. "Burnished Gold Fillings."

This clinic consisted in the demonstration of a method of burnishing gold fillings and the margins of gold inlays so as to do away with the cement line. The clinician does not claim any originality for this method, except that he adapted it to the gold inlay.

For burnished gold fillings the cavity preparation is the same as for any cohesive gold filling. Any pure gold will burnish, but the No. 4 cohesive gold foil or the rolled cylinders are preferable to the various makes of crystal gold. The clinician used for this purpose blued steel instruments of his own make, made from old instruments, and claimed that three burnishers were sufficient for the work. The tooth and the surrounding surfaces should be absolutely dry and clean of dried mucus or stains that would contaminate the burnishers.

The clinician claimed for his method the following advantages: The absence of shock to the patient from the use of mallets; the ease with which the operator may fill palatal surfaces; the possibility of building on a filling, if it is found that the contour is not sufficient, by simply cleaning the surface and burnishing directly upon the old filling; last, but not least, beautiful appearance and durability.

For inlays the technique is the same. The inlay should be made of a high-karat gold, although one can burnish very nicely on 22-k. gold.

DENTAL EDUCATIONAL COUNCIL OF AMERICA.

Secretary's Annual Report, presented in July 1911.

By **HENRY L. BANZHAF, B.S., D.D.S., Milwaukee, Wis.**

THE articles of organization of the Dental Educational Council of America adopted at Denver in July 1910 provide that the secretary shall receive the reports from all committees, and based on these reports shall prepare an annual message to the Council for its consideration. The Executive Committee gave special consideration to this matter, and after some deliberation decided that it would be best to present what may be termed an historic review in addition to the report on what has been accomplished during the year.

This report is not written on the theory that it contains the last word about dental education, neither is it intended to suggest that we have solved every problem, but your secretary will submit facts regarding conditions as they were found to exist after a somewhat brief inquiry.

HISTORY OF ORGANIZATION.

For the past two years there seems to have been a misconception in the professional mind as to what the Council is, how it was organized, what its powers are, and what it is trying to accomplish. Then, too, there has been but a limited opportunity of giving publicity to the work of this organization. The first move toward the organization of this body was made in August 1909, at Old Point Comfort, Va., when pursuant to a call issued by two committees representing the National Association of Dental Examiners and the National Association of Dental Faculties a meeting was held at Hotel Chamberlain. Those present were: For the N. A. D. E.—Chas. P. Pruyn, Wm. C. Deane, S. C. A. Rubey, Geo. E. Mitchell, and B. Rutledge; for the N. A. D. F.—J. P. Gray, Wm. Carr, W. E. Grant, D. J. McMillen, and Henry L. Banzhaf.

All who attended were called upon to speak, and it was the consensus of opinion there expressed that it was high time that these two great national bodies should join forces in deliberation and action on a basis of mutual confidence and respect. It was held also that instead of each body working alone, both bodies should work together for the uplift of dentistry and dental education.

It was first thought that it would be wise to organize a council on dental education after the pattern of the council on medical education of the American Medical Association, but after some discussion it was agreed that, in order to make the then proposed organization more representative, the National Dental Association should be invited to co-operate. Accordingly the secretary was instructed to invite Dr. Burton Lee Thorpe, president of the N. D. A., to appoint a committee of five members to represent this association in the organization of this Council.

A committee was also appointed to draft articles of organization, and instructed to report at the next annual meeting, to be held in Denver. During that year nothing was done except to prepare for the next annual meeting. It must be remembered that there were no funds provided, and that the original charter members did not meet again until July 20, 1910, at the Hotel Savoy, Denver, Colo. At this meeting the following appointments were reported by President Thorpe as representing the N. D. A. on this Council: J. V. Conzett, Louis Meisburger, A. R. Melendy, Richard Summa, and Howard E. Roberts.

The Committee on Organization, consisting of the president and secretary, made its report, which consisted of articles of organization for the government of the "Dental Educational Council of America." After the report of the committee had been fully discussed and some changes had been made in it, the articles of organization were adopted section by section and copies ordered printed for distribution—which has been done. These articles declare that the object of this organization is the advancement of dental education and the unifying of the standards of the various national bodies of the dental profession.

PURPOSE AND PLAN OF THE ORGANIZATION.

From the many inquiries received by your secretary it would seem that some good men thought that there was something else behind this simple declaration of fact, and it may be well to state at this time, especially for the benefit of the profession at large, that it was never intended that this organization should surround itself by a high wall of protection, or, in other words, that its plan was to protect the dental colleges specifically in anything that it might find weak or amiss in their system of education. On the contrary, it was the general belief expressed by the men present at the Old Point Comfort meeting that there were some things wrong with dental education, that dental colleges and state boards did not understand each other very well, and that by reason of their limited interchange of views these organizations were drifting farther apart instead of coming nearer together. It was found that the profession at large was interested in spots, but generally speaking there was apathy, lack of interest, and distrust of dental education as developed in this country. It was very gratifying, therefore, to the friends of this organization, when Dr. Burton Lee Thorpe, the president of the N. D. A., in his "President's address" placed the stamp of his approval upon the general purpose and plan of this organization. Among other things he said:

"In April [1910] your president was asked to appoint five members to represent the National Dental Association to co-operate with five members each of the National Association of Dental Examiners and the National Association of Dental Faculties in creating the "Dental Educational Council of America," the object of which is the advancement of dental education and the unifying of the standards of the various national bodies of the dental profession; to inspect the various colleges under their jurisdiction with a view of ascertaining the character of the work done, and whether the needs of the community in which colleges exist are fully satisfied; to perfect a model curriculum and make a study of the existing dental laws of the various states, and present a report on the possibilities of more uniform dental laws. Your president selected Drs. J. V. Conzett, Richard Summa, Louis Meisburger, Howard E. Roberts, and A. R. Melendy to represent the N. D. A. on this Council, with the hope that they may assist in bringing about the ideals proposed, which will result in giving our schools a higher standing and placing our profession where it rightly belongs."

This did a great deal of good, because it made it clear that this great national body of dentists was willing to carry its share of responsibility in such an undertaking. At subsequent meetings of the Council during this session it was urged that the Council should study the problems of dental education as any commission would undertake to study any problem committed to it. It was decided also that the Council was to have advisory powers only.

The work of this Council was delegated to three committees, namely, the Committee on Uniform Dental Legislation, the Committee on Curriculum, and the Committee on Colleges.

REPORT OF COMMITTEE ON COLLEGES.

On account of lack of funds the Committee on Colleges has not been able this year to do all it had hoped to accomplish, and has had only one meeting during the year. The committee has, however, applied itself conscientiously to the task set before it, as the following report of the chairman, Dr. W. E. Grant, will show:

"The work undertaken up to this time by the committees from the various national bodies has not been satisfactory. They have been vested with but little authority for action, and many changes have been made on the committee each year, so that the short period was not sufficient time to enable them to become familiar with the immense amount of detail and complex problems presented by the colleges, the state boards, and the state laws, which in many instances are at variance with each other.

"The question of entrance requirements, which has been before the national bodies for consideration for a number of years, still seems to be a very knotty problem, and one that demands careful deliberation and sane consideration. The fact remains that this preliminary educational requirement is one of the weakest parts of the dental educational system today.

"There are large sections of the country in which the opportunity for high-school training is very limited, and students could only obtain such training at a considerable sacrifice of time and money. There are other sections in which this training is partially provided and in which the state authorities and recent state laws promise great improvement in the next few years. These things being true, it appears that we must regulate our entrance requirements to a plane that can be reasonably maintained in all sections. We appreciate that it will be folly to make rules and regulations—as has been done in the past by these national bodies—without providing for their enforcement.

"There is a great variance in the opportunities offered the dental student that must receive attention. Thus as to the lack of technic laboratory instruction and the entire absence of any equipment or facilities for instruction in the pure science branches, and the woful neglect of practical and laboratory instruction, the equipment necessary to enable a student to properly do clinical work, insufficient clinical material, and the absence of competent demonstrators—the state boards of our country are complaining particularly of these matters, and from general observation on the part of the committee, we believe this should be remedied at once.

"We must take up the important task of a personal inspection of the dental colleges of the United States to ascertain the exact character of their work and to make a classification of them. While the committee have not had the funds at their disposal to enable them to undertake this work in the manner desired, about half of the schools have been looked over during the past year in a general way, and the result of this examination impresses the committee with its importance.

"We have now reached a time in dental educational matters in this country when a fair and full understanding as to reasonable requirements for dental colleges is absolutely necessary, and inspection made to see that these reasonable requirements are fully enforced. It is the purpose of the committee to try to work out all irregularities now existing and to settle those difficult problems which are likely to arise from time to time.

"In order to carry on this work a permanent organization with permanent headquarters and funds to meet the traveling and clerical expenses is absolutely necessary. It is not only necessary to look after a large amount of correspondence and statistical work, but, after collecting the same, the facts must be disseminated, so as to obtain the best results.

"This organization can have no legal powers. Such powers must rest entirely in the hands of the state licensing boards. It is clear that the collection of this information is a necessity. It is also clear that the publicity given to this information will be of great service in securing needed reform. Your committee feels that we cannot too forcibly present the importance of universal co-operation in this work of the Council.

"The national organizations must support this work in every sense that the word support can be used, and in addition, the individual state boards, state and local societies, and colleges, must be free in rendering whatever assistance may be asked of them or they in their wisdom think good to offer.

"It is within the power of the national dental organizations, the state boards and state societies, the colleges, and the dental profession of America, to put dentistry on a high and acceptable plane. Co-operation in the Dental Council work should be the watchword, to produce results."

PRELIMINARY EDUCATIONAL REQUIREMENTS.

It appears that the weakest spot in the dental educational system at the present time is the certificate issued by the state superintendent of public instruction or his deputy showing that the applicant has an education equivalent to that obtained in four years of completed work in an accredited high school, which is accepted by dental colleges in lieu of a high-school diploma. The difficulty seems to be that dental examiners have many different conceptions of what their duty really is in admitting students to our colleges.

A goodly number appear to believe that persons who present themselves for admission to dental colleges who have never attended a high school, and whose preliminary education is limited to the training received in the elementary school supplemented by training in business colleges and correspondence schools, and life experiences, should be admitted on passing an examination largely perfunctory in character. Some examiners require written examinations in a few subjects, others are satisfied with oral examinations of varying lengths and varying degrees of thoroughness. Persons of this kind who have been admitted to our dental colleges in the past have naturally failed to get the greatest benefit out of their dental college course because they have not had a proper foundation for the work.

Dental examiners should construe the term "equivalent education" to mean what it is supposed to mean—a high-school education in fact. We should practice what we preach, and if we are on a high-school basis for admission to our colleges, only high-school credits should be accepted.

In case an applicant does not have the necessary high-school credits attested to by the proper high-school authorities, the dental examiner should give written tests in additional high-school subjects, and the answer papers together with the original high-school credentials should be preserved.

The Committee on Colleges has not been able to systematically visit dental schools, as has already been pointed out. The questions which were sent out to all dental colleges in this country were answered only by half of them, so we can only guess what the other half are doing. Some of these colleges may be doing good work and possibly refused to answer our questions because they were indifferent, and some of them probably did not dare to answer them. The committee believes that only schools that can demonstrate their right to exist as institutions of learning and which are laboring in the interest of higher dental education should be supported by the people. A logical conclusion, therefore, is that dental colleges which are on a purely commercial basis should not be supported by the people, and that just as soon as this fact can be established by evidence which will hold in a court of law, recognition should be denied such schools by all state boards of dental examiners that work under what may be called a "modern dental law."

We should prevent the possibility of a student who has never attended a high school or an institution of learning of similar grade securing from a dental examiner a certificate, based upon a written or oral examination consisting of two or three hours, showing fourteen or sixteen units of high-school credits. It is safe to say that the friends of higher dental education are not willing to admit that we have reached a point in this country where it is necessary for dental colleges, in order to maintain the necessary standard of attendance, should be allowed to admit students in this manner. If our colleges are on a high-school standard of admission, then this should be carried out in good faith, and if we are not, then it would seem to be far better, certainly far more honest and honorable, to look at conditions as they are, and adopt a standard that all can live up to. Educational values are of more importance than hide-bound rules which are not only obsolete and are not adaptable to our present-day needs, but which are "honored more in the breach than in the observance."

PROPOSED PROCEDURE FOR ADMISSION OF STUDENTS.

With this idea in mind, your Secretary would recommend the following procedure for the admission of students to dental colleges for your careful consideration:

First. That colleges require 14 units of high-school credits for unconditional admission.

Second. That after December 31, 1911, no dental school shall admit a student who has not 10 units of high-school credits, 8 of which were obtained by regular attendance at a high school or school of equal rank, and that each year, for two years thereafter one additional unit be required until the minimum requirement for admission shall be either 12 units of original high-school credits, or in lieu thereof 8 units of original high-school credits and 4 units of credits given by an examiner as a result of a written examination upon strictly high-school branches, and that all dental examiners should preserve the question-and-answer papers until after a student has been graduated.

The minimum requirement for admission of 12 units of original high-school credits allowing the student the privilege of making up only 2 units of high-school credits should be reached as soon as possible. When this has been done this standard will be in accord with the Denver resolution adopted in July 1910. This requirement must not interfere with any school maintaining a higher standard.

Third. That no student be admitted to a dental college except on a certificate issued by a dental examiner, this to be issued in triplicate, one for the student, one for the examiner, and one for the dean of the college.

Fourth. That there be two kinds of certificates, unconditional and conditional. The nature of the unconditional certificate is self-explanatory; the conditional certificate shall explicitly state the credits upon which a student was admitted.

Fifth. That no student shall be graduated by a dental college until he has presented to the dean an unconditional certificate of admission.

Sixth. That all state boards require of each applicant for admission to the licensing examination, that he present an unconditional certificate of admission to a college, together with all high-school credentials issued by high-school authorities, and the question-and-answer papers written at examinations given by the dental examiner upon which the issuance of the unconditional certificate was based, besides his diploma of graduation from a reputable dental college.

Seventh. That if the Committee on Colleges cannot visit the schools in order to personally examine conditions existing there, then the dental examiner for each dental college should send to the committee, not later than December 31st of each year, the original credentials for each senior student, together with the question-and-answer papers written at examinations given by the dental examiner.

Thus it may be seen that it is possible not only to check up the work of dental colleges, but it is also possible for state boards to have an efficient check on the work of the dental examiners. By means of the method outlined above, or some other, the entrance requirements of dental colleges in the United States could be placed on a uniform basis which would command the respect and support of not only the dental profession, but the public at large. Americans are all pretty much alike, and it would not be difficult for us to get together when once we understand one another. The old attitude that prevailed among educators some years ago, that the secret working of the system should be withheld, is out of fashion. The dental profession generally, as well as the people, have a right to know what is going on in our dental colleges. The examining board in every state where there is a dental college should be taken into the confidence of the college, and they should work together in all that is done. Let the profession, the state boards, as well as the colleges, continue the study of our problems and have all matters as they are fully explained, and it will follow that the attitude of distrust and suspicion, and the belief that conditions are far worse than they really are, will disappear—provided, of course, that all men honestly apply themselves to the task of elevating our dental educational system. The exercise of more care in the discharge of the administrative function of a dental college must be the first beginning, and even though mistakes have been made, intentionally or unintentionally, this should not be regarded as sufficient cause to despair of the future.

The dentistry of today is the splendid profession that it is because of the achievements of our honest progressive educators, and there is no warrant for placing honest dental colleges in the same class with those which are dishonest, and this has too often been done. In the future, let us hope, it will not do to point with pride simply to a specially designed building with modern equipment for dental teaching, a well-planned curriculum of study, a high-grade faculty of teachers, and a loyal and successful alumni body. We must have a more rigid enforcement of entrance requirements and exercise greater care in advancing students to higher classes in our colleges. If this is done, many of the standing rules of the N. A. D. E. and the N. A. D. F. will no longer be necessary, because the administrative and educational function of our dental colleges will have been honestly met, and mutual confidence not only will return, but will remain with us.

BROADER INTERPRETATION OF RULES ADVOCATED.

The matter of granting advanced standing to students by the deans of colleges, should be put upon a broader educational basis which is in keeping with modern and advanced thought. Colleges should be given more latitude to interpret this for themselves, and in accordance with their rules. Colleges should be allowed to confer degrees at other than the specified time of each year. This regulative rule is nothing short of a hobble which in no way makes for efficiency. There is no justice in keeping a student a year who has failed in one or two branches, and which failure could be made up in two or three months, or one semester at the most. In this matter as well as in the matter of conferring honorary degrees, colleges should be permitted to use their inherent discretionary power. A negative rule in these matters hinders the proper progress of education, and ofttimes needlessly robs students of time that might be devoted to beginning their life-work as early as possible.

In most states there is a law which requires the state board to admit to its licensing examination only graduates of a reputable dental college. Therefore, if the rule which is now in existence, and which forbids the conferring of honorary degrees were abrogated, there would be very little chance of abuse of such power, but it would give institutions of learning the right to confer an honorary degree upon men who entered our profession many years ago and who by their efficient services have merited this distinction.

Let us throw back the shutters, open the windows, and let the light of progress and knowledge shine in. Let us stop feeding ourselves "baled hay," and partake freely of truth and wisdom as applied to modern dental education to the end that the work of the teacher will be represented by the impress of one personality upon another, and will be the revealing of an enriched personality to the student, for the benefit of humanity.

FINANCIAL STATEMENT.

(Aug. 18, 1910—July 18, 1911, inclusive.)

Receipts.

National Dental Association	$50.00
National Association Dental Faculties	50.00
National Association Dental Examiners	50.00
Kentucky State Dental Society	25.00
Philadelphia Dental Societies, by Dr. H. E. Roberts	30.00
Dr. Wm. Carr, New York; personal..	25.00
Pennsylvania State Dental Society ..	25.00
Massachusetts State Dental Society ..	25.00
Missouri State Dental Society	25.00
Tennessee State Dental Society	25.00
Wisconsin State Dental Society	25.00
Illinois State Board of Examiners ..	25.00
Pennsylvania State Board of Examiners	10.00
Massachusetts State Board of Examiners	10.00
Wisconsin State Board of Examiners	10.00
Total receipts	$410.00

Disbursements, as per vouchers.

Aug. 1909 to July 15, 1910—printing, stenographic services and petty cash	$41.60
Abbie Brown, stenog., June 1910—August 1911	45.38
Evening Wisconsin Co., printing letter-heads, envelopes, Articles of Organization, and postal cards	44.25
Postage	2.34
Postage on stationery sent to all Council members	.72
Postage on correspondence	1.34
Expressage	1.69
Long dist. tele. to Dr. Pruyn	1.65
T. S. Gray Co., supplies	5.03
H. H. West Co.	4.37
I. X. L. Letter Co., circular letters	4.75
Postage on letters sent out regarding Cleveland meeting of Council	4.60
Brought forward	$157.72
R. Keogh, stenographic services	15.00
Dr. W. E. Grant, stenog. and clerical	39.90
Exchange West Side Bank	2.25
Total	$214.87

Receipts	$410.00
Disbursements	214.87
Cash on hand	$195.13

HENRY L. BANZHAF, *Sec'y-Treas.*

Note.—The foregoing Report of the Secretary was received by the Dental Educational Council and referred to the committees on Curriculum and Colleges, to come up for consideration at the meeting of the Council to be held in January 1912.

THE DENTAL COSMOS

A MONTHLY RECORD OF DENTAL SCIENCE.

Devoted to the Interests of the Profession.

EDITED BY

EDWARD C. KIRK, D.D.S., Sc.D.

PUBLISHED BY

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PHILADELPHIA, MARCH 1912.

EDITORIAL DEPARTMENT.

AN EDUCATIONAL DANGER.

AMONG the conferences recently held in Chicago, none were more important or of more general interest than the meetings of the Institute of Dental Pedagogics, at which representatives of the majority of American dental schools met together to exchange ideas and discuss methods of conducting the training of students for the professional work of dental practice. The range of topics under consideration covered nearly the whole dental curriculum, and the discussions dealt not only with the subject-matter of dental study, but more particularly with pedagogical methods—the means by which a knowledge of dentistry can best be imparted to the mind of the student and his skill in the art of dentistry developed most efficiently. This latter aspect of the work of the meetings was paramount and in harmony with the purpose of the Institute. A noticeable feature of the meetings was the preponderance of time and attention given to the consideration of those departments of the curriculum that relate to the biological side of the subject. In the earlier history of the Institute, when it was known as the Technic Association, the main subject for consideration appeared to be the technical training of the student in the craftsmanship of his professional work, and the adaptation of the technic method to the elucidation of the scientific or so-called theoretical subjects of the curriculum. A reaction from this attitude occurred when the Institute was given its present designation, and its field of study was at once placed upon a broader foundation. During the subsequent period a noticeable development has taken place in the character of the work of the Institute. Teaching methods in relation to all departments of the dental curriculum have been under discussion, and many suggestions of great pedagogical value have been the outgrowth of its meetings.

There is, however, a natural tendency which manifests itself in this as in all deliberative bodies of a similar character, to endeavor to so harmonize and unify methods that they may be used interchangeably among the institutions represented in the membership—to "standardize methods," as it is called, and bring the whole educational body to a common level of teaching method. The educational danger in this tendency to standardize teaching methods is by no means a fanciful one, but is of real practical importance when measured by its possibilities of harmfulness to the mentality of the student—a danger that is manifested in two ways: First, by the tendency to unify teaching upon a basis of generalized fact when the data upon which the generalization is based are erroneous or incomplete; and second, the failure to take into account the factor of variability which is an inherent element in all cases where the phenomena of vital action are under consideration. And a third danger, which is really a corollary of the other two, is the failure to recognize the variable individuality of the student-material, which is necessarily subordinated under a "standardized" system of professional instruction.

The modifications of teaching methods in operative dental technique that have arisen out of the misconceptions of the phrase "extension for prevention"—by teachers whose understanding of the contained and related truths appears to be fairly expressed thusly: "Extension will prevent, and therefore the more we extend the more we prevent"—have led to an extent of tooth mutilation that is already producing its full crop of operative failures and its equally large crop of failures of dental practitioners. The essence of the misconception in the "extension for prevention" standard is that its popularized axiom conveys no intimation that in extending to prevent dental caries there is an equivalent extension toward the certainty of pathological disturbances of the pulp and pericementum;—in short, the popularized form of the axiom "extension for prevention" is a striking example of a broad generalization based upon insufficient data.

The only elements of the dental curriculum that properly lend themselves to the principle of standardization are the scientific data underlying the subject-matter of the curriculum, and in applying these to the pedagogical methods involved in the training of students it should be a cardinal principle to adapt the method to the mentality of the student rather than attempt to adapt the student to the method of instruction. Education in the professions, if we exclude the profession of warfare, is, or should be, a development of the natural powers of the student, not a process of making duplicates of standardized parts. No calling makes greater demands upon the ingenuity and versatility of its followers than does dental professional work, and the main object of the curriculum leading to dental practice should be to develop the power of initiative and of independent, logical reasoning. The danger in the tendency to unify methods of teaching is its liability to make the student a mere copyist, a slave of authority, a memorizer of data, and to crush out instead of carefully encouraging and developing his originality and natural flexibility of resourcefulness.

BIBLIOGRAPHICAL.

LEUCOPLASIA BUCCALE. [LEUKOPLAKIA IN THE MOUTH.] By Dr. ALDO MAGGIONI WINDERLING, Professor at the Royal University of Genoa and the Italian Institute of Stomatology of Milan. Pp. 230, 8vo, with six partly colored plates. *F.*5.00. Milan: Società Editrice Libraria, 1911.

Basing his study upon a well-nigh complete bibliography comprising an extensive polyglot literature, and aided by careful research and vast personal experience, the author has set for himself the grateful task of bringing light and order into our knowledge of this disorder, which from its pathogenesis to its treatment has been the subject of diverging opinions and contradictory statements. He has succeeded in reconciling these diversities in regard to the etiology of the disease, and in indicating the reliable lines of diagnosis and therapeutic treatment, so as to give a very hopeful prognosis in view of modern means of therapeutics with agents such as salvarsan.

The book opens with an historical review of the descriptions and methods of treatment of leukoplakia since 1818. In the first part, the symptoms are very clearly described and are illustrated by three excellent colored plates. The complicated etiology and pathogenesis is treated in a masterly manner; the divisions and subdivisions employed afford a clear survey, and the history and habits of patients, and also secondary symptoms observed outside the mouth, are given their proper significance.

The chapter on the morbid anatomy, in the second part, is elucidated by some excellent photomicrographs, and the chapter on diagnosis is rendered especially valuable by the mention of numerous differential symptoms in juxtaposition.

The third part of the volume contains critical notes and personal observations, which are of great interest to the specialist in this field, who will welcome this book as an epitome of the results accruing from the investigations on leukoplakia, and as opening up new vistas in regard to the etiology and therapeutic treatment of this disease.

HANDBOOK OF ANATOMY. A Complete Compend of Anatomy, including the Anatomy of the Viscera, with Numerous Tables. By JAMES K. YOUNG, M.D., Professor of Orthopedic Surgery, Philadelphia Polyclinic; Clinical Professor of Orthopedic Surgery, Woman's Medical College of Pennsylvania; Associate Professor of Orthopedic Surgery, University of Pennsylvania, etc. Third Edition, revised and enlarged. Pp. 402, 8vo, with 172 engravings, some in colors. $1.75 net. Philadelphia: F. A. Davis Co., 1909.

To every student of Anatomy this elbow-book is doubtless familiar. The present edition has been brought up to date in regard to such changes as have become necessary through the advances of anatomical science since the publication of the last edition. The section upon the Nervous System has been partly re-written, and is elucidated by plates showing schematically the distribution of the various systems. The original colored plates of the Arterial System are a new feature. In these plates, however, as well as in those presenting the nerves, the effort to offer the most complete classification in the smallest possible space produces a painfully crowded appearance, which confuses the mental picture and is most trying to the eye. The "pull-out" arrangement of these and other plates and tables is surely not practical, since in manipulating the "handbook" they are invariably torn, much to the disgust of any student who values a neat book. The numerous drawings, while meritorious in themselves, unmistakably bear the stamp of a past period of lithographic art, and the print and arrangement of the pages impart to the reader a sensation of restless monotony and premature fatigue. In our opinion, this book at once offers too much and too little. From a handbook we expect, rather than an endless enumeration of parts and parts, more text and many more illustrations, while for an epitome or quiz compend the book is too elaborate. Whether a happy medium between these two possibilities can be found, and, if so, whether it would be practical, seems doubtful.

OLD AGE DEFERRED. THE CAUSES OF OLD AGE, AND ITS POSTPONEMENT BY HYGIENIC AND THERAPEUTIC MEASURES. By ARNOLD LORAND, M.D., Carlsbad, Austria. Third Edition, translated with additions by the Author from the third German edition. Royal 8vo, 480 pages. Cloth $2.50 net. Philadelphia: F. A. Davis Co., 1911.

Of all fads the health fad is the most laudable, and one which has never been and will never be unfashionable. One of the most rational and broad expositions of the measures that make for health and longevity is this book of Lorand, who happily presents the results of the latest scientific investigations on this subject in a style that is attractive alike to the specialist engaged in the preservation of health and to the layman. Its popularity is evinced by the fact that within the year 1911 three reprintings of the American edition have become necessary, and that the work has now been published in nine different languages, three revised editions in the German, two in the Dutch, and two in the French language having appeared.

The present American edition is simply a reprint of the original American text, which was reviewed in the June 1911 issue of the DENTAL COSMOS, at page 722. A revision of the text and closer conformity to the "American" idiom seems imperative for any subsequent edition that may appear; for, while the "booky" and at times ungrammatical and non-idiomatic English of the author and translator has its charms for the linguist, the average reader is generally unable and unwilling to make due allowances.

ANATOMY: A MANUAL FOR STUDENTS AND PRACTITIONERS. By JOHN FORSYTH LITTLE, M.D., Assistant Demonstrator of Anatomy, Jefferson Medical College, Philadelphia. Second Edition, revised and enlarged. Pp. 491, large 12mo, with seventy-five engravings, $1.50 net. (The Medical Epitome Series.) Philadelphia and New York: Lea & Febiger, 1911.

The history of this little work is interesting. The original issue was published from the manuscript of Dr. F. J. Brockway, whose work was so widely appreciated that it ran through several printings, and in response to the continued demand was revised with additions and rearranged by Dr. Henry E. Hale. This edition was likewise widely approved, as indicated by the call for successive reprintings. The present new and revised issue is executed by other but no less able hands, and brought up to date. The book, by its text, arrangement, print, and garb, at once ingratiates itself with the reader or student. It offers much more than the essential terms of human anatomy agglutinated to each other by laconic text, or simply enumerated in apparently endless sequence. The arrangement of the text is similar to that of "Gray's Anatomy," and the variations in the type and the clearness of the print impart to the pages a clean and lucid appearance. The illustrations are good, and are not a repetition of familiar "old-timers." Most of them have the inscriptions clearly printed upon the part itself which they designate, a highly appreciated time- and temper-saving device. In future editions an even more liberal sprinkling of such illustrations will be welcomed, as an immensely valuable ocular aid to the memory, which in anatomy receives its severest tax. If we had to pick from the goodly number of anatomical epitomes now in the book-market, one for memorizing, reviewing, and studying, this is the one we would select.

REVIEW OF CURRENT DENTAL LITERATURE.

[*Deutsche Monatsschrift fuer Zahnheilkunde*, Berlin, December 1911.]

CONTRIBUTIONS TO THE AVOIDANCE OF FAILURES IN THE MODERN METHOD OF ANESTHESIA BY NOVOCAIN INJECTION. By Dr. Hans Seidel.

Seidel has made over 7000 novocain injections, one thousand of which were carefully noted, with all the concomitant symptoms, for the sake of statistics. The most important contribution which he makes toward the further perfection of novocain injection is the omission of thymol in the injecting solution, since thymol, even in a concentration of 0.025 per cent. produces pain. He finds that sterile physiologic salt solutions of novocain are stable for an indefinite period of time. The 1:1000 solution of synthetic suprarenin is relatively less stable, while the mixtures of novocain and suprarenin solutions possess very little stability. It is less important to make a fresh novocain solution for every case than it is to avoid contamination of the novocain and suprarenin before the injection. Solutions made of tablets, and especially fresh mixtures of separately preserved solutions of novocain and suprarenin, are to be preferred to the preparations sold in ampules ready for use. Discolored novocain-suprarenin solutions should not be employed, as they are deficient in anesthetizing power and are irritant. The most favorably indicated dose of suprarenin to be used as admixture in normal cases is 0.00002 per cc. In adding the suprarenin from a standard pipet, the pipet should be held in a perfectly vertical position, as slanting positions at various angles produce considerable variations in the number and size of the drops obtained.

[*British Dental Journal*, London, December 1, 1911.]

THE PREVENTION OF DENTAL DEFORMITIES. By Dr. E. A. Bogue.

In summary, Bogue argues as follows: The prevention of dental deformities requires the retention of the deciduous teeth in their proper positions until the permanent teeth are ready to erupt. Adenoids are a cause of dental, nasal, facial, and thoracic deformities. Their hypertrophied condition may be discovered at a very early age by the presence of snuffling, ear trouble, paroxysmal cough, or mouth-breathing. Adenoids can generally be removed easily during the first year of life without an anesthetic, and almost without hemorrhage or pain. Their early discovery and removal and the thorough performance of the functions of mastication and breathing are the surest preventives of irregularities in the deciduous teeth. These irregularities are about as frequent in the deciduous as in the permanent teeth. The surest preventive of dental deformities as well as of those contagious diseases which are acquired through mouth-breathing consists in spreading the arches of the deciduous teeth when they are too narrow, and in correcting any malpositions present. The correction of dental deformities before the sixth year not only assures correct arches in the permanent denture, but aids in the correction of nasal stenosis due to deflections of the septum, and of anterior curvature of the spine, which carries with it the ribs, an irregular breast bone, and stooping shoulders. Perfectly close and regular deciduous teeth at five years of age constitute a marked deformity. The normal arch of the deciduous teeth at five and one-half years of age, the anterior teeth being spread apart normally, should correspond in size to the arch of the ten anterior teeth of the permanent set at the time of their eruption.

[*American Orthodontist*, New York, No. 1, 1911.]

HABITS. By Dr. Edward H. Angle.

A cause of malocclusion deep-seated, far-reaching, and so difficult of correction as to be one of the most serious hindrances to the successful practice of orthodontia, is what may be termed abnormal habits of the oral muscles. These consist in very frequent manipulations of the lips, cheeks, or tongue in such a manner as to disturb the balance of the normal forces, bringing abnormal pressure to bear on the teeth, forcing them into and maintaining them in characteristic positions of malocclusion, the form of the malocclusion depending on the muscles abnormally exercised and on the manner in which they are exercised.

So powerful do some of these muscles sometimes become, and so frequent is their exercise of abnormal pressure on the teeth, that no ordinary, passive form of mechanical retention seems sufficient to effectually combat the force. Even mechanical retention in these cases is at best only palliative. The only real hope for a successful and permanent cure lies in the overcoming of the habit, which often gives so little evidence of its presence that both patient and operator are wholly unaware of its existence, or both patient and parents usually stoutly deny it. Owing to the psychological nature of these habits, the orthodontist is powerless, unless the patient and his parents have sufficient determination and persistence to really overcome them.

These habits seem common with all nervous children, especially with girls, and are most pronounced during periods of unusual nerve strain. One common form is the drawing of the lower lip slightly underneath the cutting edges of the upper incisors, producing labial protrusion of these teeth. A very similar result is produced in the upper incisors by the habit of very frequently protruding the tongue slightly to moisten the lower lip. Contracting the lower lip against the lower teeth, while the jaws are kept closed or held slightly apart, or the lower jaw is slightly protruded at the instant of contracting the lip, usually produces crowding and overlapping of the incisors and canines in a degree proportionate to the amount of force exerted by the lip, sometimes even forcing the bicuspids into torsal, buccal, or lingual occlusion, on one or both sides. The author has met with two cases, in patients of over thirty years of age, in which the force from simultaneous contraction of both upper and lower lips was so even as to carry distally all the teeth of both arches without disturbing their arrangement, but upsetting the balance of the features and producing a pronounced sunken appearance of the mouth, very similar to that of an edentulous person.

In another case the lower lip was so dextrously manipulated as to bring outward pressure to bear on the upper laterals, causing in them considerable labial displacement and partial rotation, apparently without disturbing the positions of the centrals.

In other cases the lip is sucked or drawn and held against or between the upper and lower teeth, always disturbing their positions according to the direction and degree of the force. This habit is rarer than and distinct from the type in which the lower lip is simply drawn in and allowed to spring back. There are other though rare cases in which one or both cheeks are drawn inward between the upper and lower teeth and held for varying periods, usually displacing the upper molars lingually. The wonderful diversity of form and direction of force which the tongue may abnormally exert on the teeth is strikingly manifest in the resultant forms of malocclusion. One of the common habits consists in pressing the tongue with various degrees of firmness against the anterior part of the vault of the arch and the lingual surfaces of the upper incisors, resulting in the protrusion of the latter, often accompanied by their infra-occlusion.

Another habit consists in allowing the tongue to rest passively between the upper and lower incisors, the jaws being slightly separated, the result being that the incisors are prevented from erupting fully, while the molars, owing to lack of occlusal force, erupt into supra-occlusion. These abnormal habits, which occur in endless variations and produce an infinite variety of malocclusions, are obviously but symptoms or manifestations of conditions which are probably deep-seated in the mind, and require much study and investigation before the orthodontist will be able to cope with them scientifically.

[*Oesterreichisch-Ungarische Vierteljahrsschrift fuer Zahnheilkunde,* Vienna, October 1911.]

A NEW METHOD OF SECURELY FASTENING PORCELAIN FACINGS TO THE GOLD BASE OR CAP OF CROWNS AND BRIDGES WITHOUT SOLDERING. By Dr. S. Silberer, Vienna.

In the procedure described, ordinary vulcanite pin teeth may be used. The pins are bent together to form a loop. After the tooth has been ground to fit, the loop is filled with hard wax and well oiled, as is also the entire back of the tooth, whereupon it is fastened to the base or cap of the crown with molding wax. The wax is carved to the desired shape of the finished crown, allowing the backing to extend either to the incisal edge or leaving this margin free, thereby preserving the color and natural appearance of the tooth. Through this wax backing a thin, pointed instrument is passed in such a way that it goes through the loop formed by the pins; this instrument is then withdrawn and the tooth removed from the wax backing. This wax backing now presents on its anterior surface a hole for the loop, and a vertical canal communicating with this hole. In this canal a thin graphite point is inserted, and the wax backing is invested and cast. After casting, the graphite point is reamed out, the reamer either passing through the base or at least making an indentation in the same. The facing is then tried on the base and backing and fastened to it by passing a pivot of eighteen-karat gold wire into the canal, engaging the loop of the facing, which is cemented to place. The protruding end or ends of the wire pivot are cut off, burnished, and polished. This procedure is adaptable to Richmond crowns, porcelain-faced shell crowns, or bridges. In case of fracture of the facing, the cement holding the pin loop and the pins themselves are removed, and the gold-wire pivot is prized from its canal, most suitably with a sickle-shaped, sharp instrument, which is passed into the hole for the pin loop, engaging the pivot and prizing it from place. A new facing and new wire pivot are all that is needed to complete the repair.

[*Le Laboratoire et le Progrès Dentaire,* Paris, November 26, 1911.]

RE-COVERING THE EXPOSED NECKS OF TEETH BY AUTOPLASTY. By Dr. P. Rosenthal.

The exposure of the necks of teeth, when not the result of a diathesis or general pathologic condition, may be remedied by autoplasty, which yields immediate and fairly permanent results. In an otherwise normal denture, one or two teeth may present exposed necks owing to a local accumulation of tartar, traumatism, erosion, or caries. Such cases of recession of the gum can be remedied only by a surgical operation, provided the patient is not too far advanced in age and enjoys normal health and vitality. First of all the affected tooth is subjected to a thorough mechanical cleansing, and its surface contour, if necessary, is restored by a gold filling. The gum above the tooth to be operated on is carefully sterilized with tincture of iodin, and a horizontal incision is made of the width of the tooth, at right angles with the long axis and sufficiently high up on the gum to furnish a good-sized flap. This incision should involve the periosteum. The flap is then stripped off the bone by inserting a fine instrument under it, starting at the neck of the tooth, and should be large enough to allow of easy mobility. A silk ligature is then passed under the central portion of the flap parallel with the incision and taking in almost the entire breadth of the flap. Another ligature is tied tightly around the free portion of the tooth, and to this ligature the first ligature is secured, the flap being drawn up a little higher than the normal gum line of the tooth to allow for any recession from cicatrization. The wound and the ligatures are painted with tincture of iodin, this antiseptic treatment to be repeated daily. From the second day on the gum is massaged in the direction of the long axis and toward the free portion of the tooth. On the fifth or sixth day the ligatures are removed. As a rule, cicatrization is then sufficiently advanced to prevent recession of the flap. The primary incised wound fills up completely without leaving a scar. The author claims that in the cases kept under observation for several years the results are still perfect. It seems, however, doubtful, to say the least, that the process of healing is as rapid as he would have us believe, owing to the continual presence of bacteria in the mouth, which can surely not be combated by one daily application of tincture of iodin.

[*Deutsche Monatsschrift fuer Zahnheilkunde*, Berlin, September 1911.]

THE INFLUENCE OF PARATHYROIDECTOMY UPON THE INCISORS OF RATS.

By Dr. P. Preiswerk-Maggi, Bâle.

These most timely experiments confirm the observation that the loss of the parathyroids produces marked changes in the ectodermal tissues in rats, affecting the hair, the cornea, claws, and teeth. The pulp tissue in the teeth of the animals experimented upon becomes less dense, and in case of fracture of the tooth succumbs to necrosis. The odontoblastic layer undergoes changes, first in its inner and then in its outer layer, and is finally replaced by pulp tissue. In the pulps almost constantly, in necrotic ones always, calcium infiltrations are noted in the form of spheres. The uncalcified layer of dentin increases at the expense of the calcified portion, the border lines of the uncalcified dentin toward the pulp and the calcified stratum assuming a wavy shape. The interglobular spaces become more pronounced and numerous, and enlarge considerably. The enamel presents furrows, pits, and grooves, and likewise assumes a wavy form. First the outer, then the inner enamel epithelium becomes less dense, and is gradually replaced by connective tissue. The periosteum is thickened, its bloodvessels are distended to their full capacity, and in certain cases the periosteum exhibits symptoms of inflammation. Considering the functional and genetic analogy between the osteoblasts and the odontoblasts, it is not surprising that the disturbances noted in the function of the odontoblasts are also evident in the product of the osteoblasts, *i.e.* the bone.

The author illustrates his interesting article with a series of beautiful photomicrographs showing the histological changes observed in the teeth of the rats experimented upon, and gives a complete bibliography on this important subject, which is bound to occupy the interest of dental research for some time to come.

Bulletin du Syndicat des Chirurgiens-Dentistes de France, Paris, December 1911.]

BRIDGES OF ALUMINUM ALLOYS. By Dr. Richard, Paris.

The author speaks a word in defense of aluminum for cast bridges, as it possesses greater strength than porcelain in posterior portions of the mouth, can be used liberally to fill out the cheeks, for which purpose gold or platinum is too expensive, and finally, owing to its reasonable price, offers the benefits of bridge work to a large class of people who are otherwise condemned to wearing vulcanite plates. In preparing the abutments for aluminum bridges, a strong support must be provided by liberally cutting the abutment teeth and by securing solid supports by pivots, large inlays, or crowns, since aluminum of slight thickness possesses little solidity. Platinum pivots, aside from their forbidding price, are unsuitable, since aluminum readily alloys with platinum and weakens the pivots. German silver pivots, however, give very good results. Aluminum bridges are not unsightly. Unfortunately, owing to the lack of resistance of this metal to strain, porcelain teeth in these bridges give little satisfaction. Although, generally, pure aluminum is considered as the only serviceable form of this metal in prosthetic work, the author has found that after four years of service in the mouth, the following alloys have undergone no changes either in color or shape: Copper 5.5 parts, tin 2 parts, aluminum 92.5 parts; or tin 7 parts, zinc 10 parts, aluminum 83 parts, the latter alloy being the more elastic. These alloys appear less dull and therefore more sightly than pure aluminum. In the author's experience, cast aluminum inlays wear less rapidly than gold inlays. Aluminum bridges can be cast rather easily, the procedure being essentially the same as in cast gold bridges, except that fairly stout German silver pivots are employed. Before cementing to place, minor changes to facilitate perfect adjustment can be easily made, owing to the relative softness of the alloy.

[*Deutsche Zahnaerztliche Wochenschrift*, Berlin, October 14, 1911.]

THE USES OF CELLULOID PLATES IN DENTAL PRACTICE. By Dr. Robert Neumann, Berlin.

Celluloid plates render excellent service in the following cases: After extracting upper teeth or roots, in preparation for a plate for instance, patients frequently bite into the gingival tissue of the upper jaw with the teeth that remain in the lower jaw, tearing open the extraction wounds or lacerating the mucous membrane of the hard palate. They are also often unable to masticate even very soft foods, and complain of pain on closing the mouth. In such cases a temporary celluloid plate enables them to masticate food and favorably influences the healing process in the wounds.

In persistent hemorrhage after extraction, an iodoform gauze tampon in the alveolus can be firmly retained and the hemorrhage arrested by a celluloid plate, if no teeth are available for securing the tampon by wire or silk ligatures to neighboring teeth.

If in extracting a molar or bicuspid the antrum has been opened into, the alveolus is carefully packed with iodoform gauze, without exerting any pressure in order to avoid infection, and the alveolus is covered by a partial celluloid plate. In replanted teeth, fixation is of the greatest importance, since the healing process stands in direct ratio to the degree of immobilization secured. In such cases, a celluloid appliance worn for from three to four weeks is more satisfactory than ligatures, which are often difficult to insert and afford little stability. In immediate correction of a malposed tooth—the so-called *redressement forcé* of the French—a partial celluloid plate is adjusted to the corrected tooth until it has become firm again. Before the operation an impression is taken, the malposed tooth is cut away from the model and replaced in the position which it is to occupy after the operation, and the celluloid plate is pressed on this corrected model, and inserted.

After minor orthodontic measures such as rotation of retrusion of a tooth, retention plates of celluloid are very serviceable.

If a tooth has been loosened by acute pericementitis or trauma, or is so sensitive that opening into the pulp-chamber would cause unbearable pain, the author takes an impression in modeling compound, makes a partial celluloid appliance on the model, and inserts it in the mouth with rapid-setting cement. The tooth, thus firmly secured, may then be treated, and the patients are enabled to masticate without pain. The readiness and ease with which celluloid appliances can be made, inserted, removed, and reinserted render their employment very valuable.

[*Lancet*, London, November 11, 1911.]

"COMFORTER" CARIES. By Dr. E. H. R. Harries.

The author refers for his nomenclature to the article of W. H. Bowen on "Otitis Media from the Rubber 'Pacifier,'" which appeared in the September 1911 issue of the *Lancet*, in which Bowen, after long observation of infants in the East London Hospital for Children, expresses the belief that many cases of otitis media in infants are caused by the rubber "pacifier" or "comforter." The class of cases he refers to is composed of fairly healthy infants with no attendant infectious disease, and with no evidence of adenoids with which to explain the otitis media from which they suffer. As otitis media is usually the result of oral sepsis from mouth-breathing due to adenoids, or from an attendant infectious disease, it is fair to argue from analogy that the class of cases under discussion is the result of oral sepsis introduced by the comforter. This instrument, usually of rubber and attached to the infant by a string or tape, when not in the infant's mouth comes in contact with all sorts of unclean things. Being usually moist when dropped, particles of all sorts easily adhere. It is usually reinserted in the infant's mouth without being cleaned. There is also a lamentable practice among some baby-tenders to give the comforter a preliminary suck before putting it into the baby's mouth. It can be plainly seen how easily the child's mouth may become infected in this way. The comforter introduces sepsis leading to catarrhal processes which spread by the tube to the middle ear, although giving very little, if any, evidence in the mouth, oropharynx, or nasopharynx. Harries, in the paper under review, goes farther than Bowen. In his opinion, the cause and effect seem sufficiently closely related to justify the title "comforter caries." In all the cases reported a history of habitual use of the comforter was obtained from the mothers. These children exhibited extensive caries or marked hypertrophy of the upper lip or both. It would, of course, be as foolish to assert that caries results in all or in the majority of infants who have indulged in the comforter for lengthy periods as to assert that all smokers of clay pipes develop epithelioma. Yet the cases reported represent concrete instances of the damage which has been caused by this appliance. In the detail descriptions of these cases it appears that these children exhibited marked caries of the upper and lower incisors or malformations and irregularities of the same, deformity of the upper lip, and well-marked visible and palpable hypertrophy of the orbicularis oris muscle. All these children were about three years of age or less, and showed no symptoms of rickets or syphilis. The fact that only their incisors had been attacked by caries shows convincingly that the comforter was the sole causal agent. Enlightenment of the mothers of poor children in regard to the dangers lurking behind this popular but "accursed instrument," as Dr. Eric Pritchard calls it, is therefore another serious duty of the propagandists of oral hygiene.

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PERISCOPE.

Stable Solution of Cocain.—The following formula is recommended for obtaining a stable solution of cocain for dental purposes: Cocain 10 parts, phenyl acetate 50 parts. —*Pharmaceutische Centralhalle*, per *L'Odontologie.*

Iron Solution Given in Capsules to Protect Teeth.—The best method of protecting the teeth when taking iron consists in putting the prescribed number of drops of the tincture into an empty capsule with a dropper, putting on the cap, and taking the capsule, followed by water. In this way the teeth are not affected.—J. L. WOODRUFF, *Journ. of Amer. Med. Association.*

Repairing a Broken Facing Without Removing a Bridge.—This method consists in selecting a plate tooth of the proper size, grinding off the flange so that it will be flat like a facing, and cutting off the pins and using a little articulating paper on the side where the pins are cut off. This is pressed to place and will mark the pins that are in the bridge on the tooth to be replaced. With a carborundum disk a slot is cut wide and deep enough to receive the pins. The fitting, with the articulating and grinding to place, is continued until the tooth fits the bridge backing correctly. It is then cemented to place, constituting a very substantial repair.—J. E. METCALF, *Dental Summary.*

Carbolic Acid Burns.—Alcohol followed by glycerin is an efficient remedy for carbolic acid burns, affording immediate relief of pain. Ordinary vinegar is also very efficacious for the same purpose.—*Le Laboratoire et Progrès Dentaire.*

Method of Adding Solder in a Soldered Bridge.—When the solder in a bridge is solidified and it is necessary to add to it, the first should be brought to a complete liquid state before making the attempt, otherwise borax will be incorporated beneath the surface, and pits will result.—E. L. KANAGA, *Dental Summary.*

Instruments of Pure Nickel for Inserting Silicate Cement Fillings.—Instruments of pure nickel are most suitable for inserting silicate and other cement fillings. They are preferable to agate or ivory instruments, as they permit of easy manipulation, are nonbreakable, and do not produce discoloration of the filling materials.—*Zeitschrift fuer Zahnheilkunde.*

Cellulose Wadding.—This material has no long strands or fibers, and seems to be more absorbent than cotton. It is easily made into rolls and stays where it is placed, because its dryness and great absorbent power appear to render it almost adhesive. Many years ago the writer discarded cotton except for root-canal work, and substituted cellulose wadding.—H. J. MORRIS, *Dental Record.*

Heating Gutta-percha.—While it is common to see a dentist hold gutta-percha in the flame of an alcohol lamp or Bunsen burner, this is a very poor method, because of the danger of overheating and thereby destroying the lasting qualities of the material. Gutta-percha is best softened on one of the heaters made for that purpose, of which there are a number on the market.—W. B. TYRRELL, *Odontologist.*

Tincture of Iodin as an Antidote in Phenol Poisoning.—Maherly indorses tincture of iodin as a potent antidote in phenol poisoning. He administered a teaspoonful of the tincture in water to a negro, who, by mistake, had swallowed a strong solution of phenol instead of whiskey. The result was excellent. He also gave to children of three years of age, who had taken phenol, five drops of tincture of iodin in water, repeatedly, also with the best results.—*Bulletin Général de Thérapeutique,* per *New York Med. Journal.*

Caution in the Use of Lactic Acid in Treating Pyorrhea Alveolaris.—Care should be taken in the use of lactic acid in treating pyorrhea alveolaris in order to prevent the acid from attacking the teeth. During the past six months the writer has seen a number of cases in which caries was caused by its use, although great care had been taken in manipulating the acid.—E. E. HAVERSTICK, *Dental Summary.*

Removing Discoloration of Teeth Caused by Silver Nitrate.—If silver nitrate is to be used for hypersensitive dentin, the portion to be cauterized is wiped with a pellet of cotton saturated in the silver nitrate solution. After the desired effect has been obtained, the discolored portion is wiped with a pellet of cotton dipped in tincture of iodin, and the tooth is rinsed with a physiologic salt solution.—*Deutsche Zahnaerztliche Wochenschrift.*

Soldering Floors and Cusps to Banded Crowns.—In soldering or sweating floors and cusps to bands the Bunsen burner should be used, holding the piece high in the flame till it is about ready to fuse, then lowering it to the inner point, allowing the flame to come up around the band. Floors can easily be managed by holding them with a small pair of tweezers, but cusps should always be wired to the bands.—E. L. KANAGA, *Dental Summary.*

Comparative Effects of General Anesthetics on Blood Changes.—In a comparison of the three most popular anesthetics in regard to blood changes, we conclude that nitrous oxid causes no permanent effects of any significance. Ether causes more harmful effects, consisting in slight anemia and marked decrease in coagulation time. Chloroform causes the most harmful results, *i.e.* hemolysis and production of distinct anemia. —A. D. BEVAN, *Journ. of Amer. Med. Association.*

Manipulating the Sprue in Wax Model for Cast Inlay.—In cooling the sprue in a wax model for an inlay, the cold water should be thrown on the sprue first and then on the wax. This will prevent the soft wax from being washed away from the sprue. It is easier and more accurate, when possible, to remove the inlay by clasping the sprue between the thumb and finger instead of pliers, as in that way we can *feel* the easiest way to remove it.—E. E. HAVERSTICK, *Dental Summary.*

Points Regarding Ludwig's Angina.—Ludwig's angina usually arises from a carious tooth in the lower jaw, most frequently one of the molars. It secondarily affects either the sublingual or submaxillary salivary glands. An early board-like condition of the tissues occurs in the floor of the mouth. The principal and most dangerous infection is that produced by the streptococcus bacteria. It is a disease of a few hours' or days' duration, with a mortality of 50 per cent., and usually kills by edema of the glottis. Early recognition of the condition, with an early incision and complete drainage, is imperative.—C. N. Russell, *Garretsonian.*

Making Useful Scalers.—Broken hand instruments and old excavators can often be made easily and quickly into scalers of varying sizes, suitable either for heavy or fine work.

The procedure is as follows: The old instrument is heated against a soldering block and straightened while hot. It is then heated again, and the end beaten on an anvil at right angles to the shaft. This end will then have a tapering section. If suitably ground an excellent scaler is produced which can be hardened and tempered and will render good service.—H. J. Morris, *Dental Record.*

Capping Vital Pulps.—It is always a risky thing to cap a vital pulp, yet there are cases when a patient is unable to present for several sittings. The cavity is then excavated and sterilized thoroughly and the pulp is touched with a pellet of cotton saturated with chloroform. A piece of writing paper sufficiently large to cover the pulp is cut, dipped into chloroform, and coated with a small quantity of chloro-percha to which some aristol has been added. This capping is laid over the pulp, dried with the hot-air syringe, and thinly mixed cement is flowed over it. After the cement has set, the cavity is filled according to demands.—*Archiv fuer Zahnheilkunde.*

Artificial Teeth Not a Luxury.—False teeth are a necessity, not a luxury, and a husband is legally bound to furnish them for his wife, if she needs them. This is not the opinion of a medical or humane society, but the solemn verdict of the supreme court of Wisconsin. Unless an appeal is taken to the United States Supreme Court, on the ground that this decision deprives the husband of life, liberty, or property without due process of law and therefore unconstitutionally, this pronouncement will stand as the law of the land. It is doubtful if there is any other state which has thus safeguarded the rights of its feminine citizens. Married women in need of teeth should at once move to Wisconsin.—*Journ. of Amer. Med. Association.*

Inserting Temporary Gutta-percha Fillings.—There are many ways of doing this everyday operation, the usual one being to warm the gutta-percha on a burnisher and insert it in the cavity, with the result that, when the burnisher is withdrawn, the gutta-percha comes with it, much to the dentist's annoyance. A better way is to have the gutta-percha ready in small pieces, take one up in the conveying forceps, warm the extreme end of it only, and insert it into the cavity. Then this is packed with a warm instrument touched with cocoa butter, which has a slight solvent action on gutta-percha. Cocoa butter is more cleanly than vaselin, and it is most conveniently kept in a small shallow jar rather than a tube.—H. J. Morris, *Dental Record.*

Variations in the Occurrence of Nitrite in the Saliva.—Laboratory tests on the variations of the occurrence of nitrite in the saliva justify the following conclusions: Nitrite may be diminished in quantity in the saliva, or wholly removed from it, by oral micro-organisms. The natural diminution in the quantity of nitrite in saliva, or the complete removal of nitrite therefrom, may be due to enzymes eliminated by oral micro-organisms; but such effects are also attributable to intra-cellular influences exerted by these organisms. Neither the occurrence nor the proportion of nitrite in a specimen of saliva is an index of the existence or degree of a given case of dental disease, or of the rate of its progress.—C. S. Smith and E. W. Baker, *Journ. of Allied Societies.*

A Plea for the Porcelain Inlay.—Porcelain inlay operations should be performed by all dentists who aim to please people of taste and refinement. There is no other class of fillings for which the operator will receive more gratifying praise. Then why is porcelain not used to a greater extent? The answer to this question is, Because of the skill and time necessary and the consequent fee required. The public should be trained to a proper appreciation of our services, and the latter objection would be removed; and as to skill—that is only a question of attention and qualification. If porcelain were only used when indicated, in labial, buccal and approximal surface cavities, and occasionally in a favorable cavity involving the angle of an incisor, and if all the essential details of cavity preparation, adaptation of the matrix, manipulation of the body, firing, annealing, etching, and setting were skilfully attended to, the only serious objection to the use of the porcelain inlay would be the skill and time required in its construction.—W. L. Fickes, *Dental Summary.*

The Art of Omission.—Robert Louis Stevenson, himself a master of the *ars intermissionis,* writes in one of his letters: "There is but one art—to omit! Oh, if I knew how to omit, I would ask no other knowledge. A man who knew how to omit would make an Iliad of a daily newspaper." When all medical writers have learned to omit the useless, the trite, the insignificant, and the irrelevant, many manuscript editors will find their occupation gone, but private misfortune will pass unnoticed amid the general rejoicing. *Ars longa, vita brevis;* it takes a long while to learn to be brief, but, on the other hand, nothing will more effectively extend the average span of life than general mastery of the art of omission—in medical literature at least.—*Journ. of Amer. Med. Association.*

Reinforcing Dowel Crowns and Tube Teeth.—Dowel crowns are often found to fracture. To avoid this the following method may be resorted to. Instead of a solid post, a tube is cemented into the root-canal, and a dowel crown fitted to the root. The lingual surface of the crown is then ground down until the dowel socket is exposed. A post to fit the tube is then taken and when in place should project slightly from the hole in the crown. A sheet of wax is swaged up on to the lingual surface of the crown, made to adhere to the post, and then withdrawn and cast in the usual way. It is cemented to place after the crown is in position on the root, and may be made to come flush with the edge of the root or to embrace the posterior half of it for a little distance below the gum. —W. A. Harrop, *Dental Record.*

Oral Hygiene During Typhoid Fever.—During typhoid fever, the oral and the nasal cavities demand special care. The tongue, which is usually very dry, is wetted with a mixture of equal parts of glycerin and Vichy water to soften the crusts and exudates, and these are then easily removed with a soft tooth-brush and a tongue scaler consisting of flat whalebone or a celluloid strip. The gums and the gingival interstices are cleansed with cotton tampons dipped in the same solution, and together with the teeth are brushed with a soft brush. This cleansing process is extended to the pharynx and the nasal fossæ, and repeated three or four times each day. The patient should never be allowed to drink anything before this cleansing has been applied, in order to prevent the ingestion of septic matter.—*Revue des Hôpitaux,* per *Revue de Stomatologie.*

Sulfuric Acid a Silver Solvent.—Sulfuric acid has displaced nitric acid as a silver solvent in refining precious metals. It has a decided advantage in the quartation method when platinum is a component of the alloy, as both gold and platinum are insoluble in sulfuric acid under all conditions. An alloy of platinum and silver, when the silver is largely in excess, is quite soluble in nitric acid. Another advantage consists in that it is much less expensive. It is well to bear in mind the solvent action of sulfuric acid on silver when "pickling" a silver denture. The cold acid is not very active, neither is a dilute acid. When heat is used to hasten the pickling, the boiling solution under some circumstances first parts with its water, thus strengthening the acid solution, and a point is soon reached when an active action on the silver begins. It is a wise precaution to always see that the pickle dish is full, adding water to make it so as long as it continues to be a solvent for the fused borax for the removal of which the pickling is used.—W. H. Trueman, *Dental Brief.*

A Dental Clinic for School Children in Vienna.—The efforts of a private society, the Austrian Society for the Care of the Teeth, have resulted in the erection of a model institute in the western part of Vienna, which will form the nucleus of a series of similar clinics. This Schulzahnklinik is a special small building containing a waiting-room, a surgery, a room for the extraction of teeth, and a hall for resting after the operation, and is fitted completely up-to-date in all respects. It will serve as a dental clinic for the children of five schools, mustering some 4000 boys and girls between the ages of six and fourteen. As elementary teaching is compulsory, all children must go to school. The examination of the teeth of these youngsters was made during the last two years. Nearly all children in Vienna have thus been seen by several competent dental surgeons, whose reports were the bases which served to justify the action of the above-mentioned society. It has been shown that in the majority of cases there were always carious teeth present; in fact, a child with all teeth sound was an exception. In the poorer districts, no care at all was given to the mouth and teeth by the parents, while in the wealthier districts the children had their mouths cared for, but not systematically.

Of all affected children 28 per cent. had one tooth carious, 24 per cent. two teeth, 26 per cent. three teeth, while the remainder had four or more teeth diseased. (No mention is made whether this includes such teeth as had been filled, or whether only manifestly diseased teeth were considered.) A collection supported by medical circles resulted in the provision of funds sufficient for the erection of a clinic, and the services of two able dental surgeons were secured. All children deemed fit by the school teacher will be sent to the clinic to be examined and treated. No fee is paid, but only poor children are treated, while those able to pay are advised to see their regular dentist. Within a few years, four more clinics of this type will be completed in Vienna.—*Journ. of Amer. Med. Association.*

Relations Between Mouth-breathing and Pulmonary Tuberculosis.—Rosenberg states that besides its more familiar evils, chronic obstruction of the nose modifies the respiration in a way that materially favors bacterial invasion. The bacilli not only get into the lower air-passages more readily, but they find more favorable conditions for colonization, especially in the non-tuberculous shriveling of the right apex which is so common in mouth-breathers, called by Kroenig "collapse induration." Rosenberg found this induration at the apex in eighteen of fifty cases of chronic obstruction of the nose, although there was nothing to suggest tuberculosis. Such persons are predisposed to tuberculosis on account of this local change at the apex. If it is diagnosed as a mild tuberculous process, and the patient is sent to a sanatorium for tuberculosis, he is almost certain to contract the disease, which otherwise he might have escaped. The obstruction in the nose may be the result of adenoids, but deformity of the septum and hypertrophy of the turbinate bones may sometimes be incriminated. Rosenberg cites Bluemel's experience at the Goerbersdorf sanatorium with 75 non-tuberculous inmates among the total 1700 supposedly tuberculous. He discovered twenty-eight cases of this collapse induration in this group of 75. From the Belzig sanatorium it has been reported that nasal affections were found in 84 per cent. and throat affections in 76 per cent. of 120 patients examined. Rivers, in England, in examining 5000 persons found twice as many mouth-breathers among the consumptives as among the non-tuberculous. Rosenberg pleads in conclusion for prompt measures to relieve nasal stenosis and thus ward off these perils.—*Deutsche Med. Wochenschrift,* per *Journ. Amer. Med. Association.*

Vaccine Treatment of Pyorrhea Alveolaris.—During the usual and indispensable local treatment, the vaccine is injected subcutaneously. The method of determining which organism is responsible for the disease is as follows: Samples of the exuded pus are caught on sterile swabs for the purpose of making coverslip films and inoculating tubes of nutrient media, generally blood agar. There is a great similarity in the appearance of pus in cases of pyorrhea. Besides pus cells, one very often finds red corpuscles and leucocytes from blood mixing with the exudation. There are bacilli and cocci in great varieties and numerous spiral rods and filamentous forms. Gram's method is used for differentiating the micrococci, as a number of the staphylococci and invariably the streptococci stain by it. The bacilli are ignored and the different cocci isolated by the usual methods of inoculating tubes or plating them out.

The blood of the patient is then tested against each of the organisms in turn to determine the amount of opsonin present for each, and that organism to which the opsonic index is particularly low or high is regarded as the responsible one, and a vaccine is prepared from a culture of it. The following organisms seem to be the chief offenders: micrococcus catarrhalis, staphylococcus pyogenes aureus, pneumococcus, streptococcus pyogenes longus. The vaccine treatment proves efficacious, even in advanced cases. There is a cessation of pus formation, and mastication without pain is established, although, naturally, there is still recession of the gums and absorption of the alveolus; yet this is no proof that the vaccine alone is responsible for the change, inasmuch as the local treatment is simultaneously being carried out, and members of the dental profession have witnessed similar results from local treatment alone. To prove the efficacy of the treatment, anything local should be dispensed with and vaccine only used, but there seems to be no record where this has been done and success attained. The general consensus of opinion at the present time is that the vaccine treatment does not appreciably help the local treatment in effecting a cure, but experimental work in this direction is still being carried out, and until we have more information on the subject, the value of vaccines in the treatment of pyorrhea must remain *sub judice.*—P. C. CHARLTON, *Commonwealth Dental Review.*

HINTS, QUERIES, AND COMMENTS.

AMALGAM FILLINGS.

So much has been said and written on the necessity of perfect cavity preparation for amalgam fillings, that no further emphasis need be laid on this phase. Amalgam possesses no adhesiveness to tooth structure, and its retention in a cavity is based on similar principles to those which apply in the case of tin or gold foil fillings.

The manipulation of amalgam in the palm of the hand is not only unsanitary, as it entails the introduction of perspiration, bacteria, and epidermal cells into the mixture, but it also interferes with the perfect working qualities of the amalgam. Sometimes the wearing of a gold ring which becomes discolored from the amalgamation of the gold with the mercury has convinced operators of the untowardness of this careless mixing method.

The removal of the steel matrix in large amalgam restorations, before the amalgam has set for some time, frequently causes a portion of the filling to come away with the matrix band.

The setting of the filling may be hastened by burnishing a piece of thin tin foil over the amalgam surface, whereby some of the surplus mercury is absorbed.

A very useful method of insuring the perfect setting of a large amalgam filling consists in fitting and soldering a silver plate matrix of thin gage, adjusting it to the tooth before filling, and leaving it on the filled tooth for a day or two, when it can be removed with perfect safety, insuring protection against distortion or crushing by the antagonizing tooth during the setting process, and a maximum durability for the future.

The contouring of a filling while the amalgam is still fairly soft can be neatly accomplished by wrapping a pledget of cotton around the closed pliers, wetting it, and molding the cusps therewith. This simple modeling contrivance leaves a dull surface on the amalgam filling, so that any excess of filling is readily located by the bright and polished portion which the antagonizing tooth leaves on the surface of the filling upon the patient's closing the mouth and biting gently on the filling. In this way the use of articulating paper is rendered superfluous. Any considerable excess of filling is removed with a spoon excavator, followed by the application of the wet cotton and pliers, and perfect occlusion is ascertained by again requesting the patient to close and bite.

After the amalgam filling has begun to set, the burnishing of the margins must be discontinued, as the amalgam becomes brittle and breaks under the pressure exerted by the burnisher, and imperfect marginal adaptation results.

The appearance, usefulness, and durability of an amalgam filling are greatly enhanced by a thorough polishing applied at a subsequent sitting.

The patient can be induced to appreciate the value of a carefully inserted and finished amalgam filling, and if he is at all worth having as a permanent patient, he will realize the justification of an adequate remuneration for the skill and time expended by the operator.

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AN ACCURATELY ADAPTED PORCELAIN FILLING.

THE following is perhaps the most accurate method yet suggested to obtain a matrix for a porcelain inlay, and one that can be applied to the most difficult cavity:

A wax impression is obtained in the manner employed for making a gold inlay, except that the wax is allowed to overlap the cavity margins. That part of the wax which came in actual contact with the tooth is now painted with a delicate coating of plumbago. The wax is then suspended in a gold electroplating solution, and the matrix is thus accurately deposited over the plumbago. The matrix and wax are next invested in the manner suggested by Dr. Jenkins of Dresden, and the filling completed by the well-known process suggested by him.

The same method may be used in devitalized teeth, with the addition of a pivot for extra anchorage.

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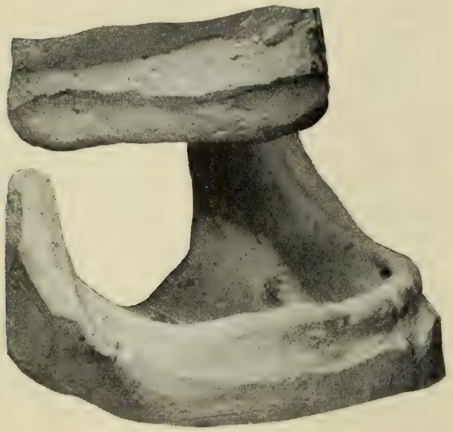
A DIFFICULT CASE FOR PROSTHETIC RESTORATION.

The patient, a man of middle years and of strong physique, measuring about six feet two inches in height, and weighing 230 lb., presented an edentulous mouth, with a marked anomaly of the comparative sizes of the maxilla and mandible, as illustrated. The teeth attacked by caries had been extracted several years ago for the sake of restoration by plates. The upper arch measures only 1¾ inches at the heel from the left to the right buccal surface of the ridge, 1½ inches antero-posteriorly, while the vault has a maximum height of ⅞ of an inch. The palate presents a layer of rather soft tissue. The lower jaw measures almost 3 inches across at the heel, and about 2 inches antero-posteriorly, causing it to protrude by fully ½ inch over the upper jaw. Even by extreme efforts, the patient cannot approximate his mandible to within more than ¾ inch of the maxilla, so that he has for some time been completely deprived of all means of comminuting food. The gums are in a healthy condition, and the patient does not give a history of any specific or other systemic disease. Owing to the entire lack of masticatory function he is at present a chronic dyspeptic. He has had four plates made for him, yet, despite the apparently favorable shape of the palate he has been unable to retain an upper plate, possibly owing to the remarkably strong development of the cheek muscles, which seem to dislodge the plate. The patient is greatly distracted, all efforts at constructing a set of dentures which would afford firm retention and sufficient articulation to insure some use in masticatory function having failed. Have similar cases been noted before, and how have the difficulties involved been overcome?



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INSTRUMENTS FOR INSERTING SILICATE CEMENT FILLINGS WITHOUT RISK OF SUBSEQUENT DISCOLORATION.

In inserting silicate cement fillings, for which such excellent qualities are claimed, many operators have become discouraged by the discoloration of the filling following the use of blued steel or nickel-plated steel instruments. The instruments of agate, bone, or tortoiseshell recommended for this purpose, owing to the inherent physical properties of these materials, are not very satisfactory, while instruments of platinum or tantalum are so expensive as to deter many operators from purchasing them.

A simple and cheap method of making suitable instruments which allow of as easy manipulation as steel instruments and which will not discolor the silicate cement fillings, consists in soldering heavy gold or platinum foil with a suitable high-karat gold solder over the point and part of the shank of ordinary filling instruments of steel, with the needle-point flame of an ordinary blowpipe or an orthodontia soldering blowpipe. If the foil is worn off by continued use, the soldering operation can be repeated.

R. H. Riethmüller, Ph.D.

Philadelphia, Pa.

OBITUARY.

DR. GEORGE G. MILLIKEN.

Died, in Philadelphia, Pa., December 22, 1911, after an operation, in his fifty-eighth years, Dr. George G. Milliken.

In the demise of George G. Milliken, D.D.S., M.D., assistant professor of operative technics in the dental department of the University of Pennsylvania, which occurred on Friday, December 22, 1911, at the German Hospital, Philadelphia, Pa., after a serious operation, the dental profession has suffered a severe loss. The friends of the deceased, who were numerous and scattered over the civilized world, feel his death keenly, and the University of Pennsylvania has lost a member whose scientific achievements have attracted universal attention.

Dr. Milliken was born in Philadelphia in 1854. He received his early education at the Friends' central high school of that city, and upon being graduated from that institution went into business with his father, who was a highly respected linen importer of Philadelphia, and with whom he remained until the fall of 1883, when he matriculated in the dental department of the University of Pennsylvania. Dr. Milliken was graduated in the spring of 1885. Among other honors which he enjoyed during his course was the presidency of his class during his senior year.

The autumn succeeding his graduation he was appointed demonstrator in the operative clinic. He served in that capacity until tne year 1888, when he resigned to enter upon the study of medicine in the medical department of the University of Pennsylvania. In 1891 he received the degree of M.D., having made an enviable record throughout his course.

In the following year, the faculty of the University of Pennsylvania again acknowledged the ability of Dr. Milliken by reappointing him demonstrator in the operative clinic. In the fall of 1897 he was elected to the more important position of assistant professor of operative technics, which he held at the time of his death.

When the Milwaukee College of Medicine and Dentistry was established, the chair of prosthetic dentistry was proffered to Dr. Milliken, but he declined to accept the offer.

In addition to his work as a lecturer and teacher in the dental department, he carried on a successful practice of dentistry in Philadelphia. He was a member of the Academy of Stomatology and of the Pennsylvania State Dental Society. At the university, under Dr. Milliken's skilful direction, and through his wonderful faculty of imparting knowledge, the students in operative technics did work which was conspicuous for its excellent character. So noteworthy were the results produced by his classes that they attracted the attention of dental educators in various parts of the world, and the demand for exhibits containing specimens of Dr. Milliken's class work came from dental organizations both in America and Europe; wherever this work was shown it became the center of interest, and a feature which ultimately attracted many students to the dental school of the university.

Dr. Milliken happily combined the qualities of a thorough teacher with those of an efficient disciplinarian. He demanded and received attention from his classes at all times by stimulating an interest in the work itself and by his intolerance of anything approaching undignified or ungentlemanly behavior in his presence. These qualities were, however, by no means inconsistent with his natural kindness of heart and his sympathy and generous treatment of all with whom he came in contact. He was charitable in deed as well as in thought, and the extent of his kindnesses and benefactions, quietly and unostentatiously performed, will never be fully known. He spent much of his time, energy, and private income in the service of others. It seems that no source of pleasure or happiness took precedence in his estimation over that which comes from helpful service to others. The life of Dr. Milliken was that of the upright Christian gentleman; strong in his convictions, earnest in enforcing them as occasion required, he was, nevertheless, as gentle and sympathetic in nature as a woman. He was loyal and steadfast, and the host of his friends who have each in their own several ways came into intimate contact with him cannot realize the depth of their loss.

Recognizing his qualifications as a teacher and his admirable qualities as a man, the faculty of the dental school had unanimously recommended his advance to the grade of a full professorship in the faculty, and while this action had been conveyed to him, his untimely death unfortunately came before the recommendation of his colleagues could be ratified by the trustees.

Interment was made at Woodlands Cemetery.

DR. SAMUEL A. FREEMAN.

Died, at his home in Buffalo, N. Y., December 11, 1911, in his eighty-second year, Dr. Samuel Arthur Freeman.

Full of honors and rich in the esteem of a very large circle of personal and professional friends, Dr. Samuel A. Freeman passed away on December 11, 1911, in Buffalo, N. Y. Dr. Freeman was born in South Orange, N. J., in September 1830, of an ancestry running back through the Starbucks and the Coffins of Martha's Vineyard, and was therefore of good New England stock. His early education and training were received in the public schools of Hoboken, N. J., and later he took up the study of medicine in the New York Medical College, from which institution he was graduated with the degree of M.D. in 1855. Soon after graduation he removed to Fort Wayne, Ind.—at the time a small frontier settlement—and commenced the practice of his profession. On the breaking out of the civil war Dr. Freeman enlisted in the Forty-second Indiana Volunteer Regiment as a surgeon, and immediately went to the front, where he remained, seeing much fighting, until 1863 or the early part of 1864, when owing to the breaking of his health he resigned, and was honorably mustered out of the service.

On returning to his home in Fort Wayne and finding conditions there much changed, he decided to remove with his family to Buffalo, N. Y., in 1864. On arriving in Buffalo he at once took up the practice of dentistry, which profession he had studied for a couple of years in the office of Dr. Knapp in Fort Wayne prior to entering the army. At once Dr. Freeman identified himself with the profession in Buffalo, entering actively into everything pertaining to the welfare and development of dentistry, especially in relation to dental organizations, and in 1864 associated himself with others in the formation of the Buffalo Dental Association, in which society he remained a member and an active worker up to the time of his death. He also became a member of the Western New York Dental Association, a society which was merged into the Seventh and Eighth District Dental Societies upon the formation of the Dental Society of the State of New York in 1868.

In all the movements leading up to the formation of the district and state societies Dr. Freeman took an active and influential part, and to his wise foresight and judicial counsel was due in no small measure the development of a scheme of organization for state societies not surpassed, if equaled, in all the years that have followed.

On its organization he was elected the first secretary of the Eighth District Society and served in that office for a number of years. He was elected its president in 1882, serving for one year, and in 1895 was elected librarian, serving in that office till May 1911. During his term as librarian he not only did his best and most enduring work, but, what is of more importance, he gathered together what is thought to be the most extensive and valuable dental society library in the world, and one which is expected to be known hereafter as the "S. A. Freeman Memorial Dental Library."

Dr. Freeman became a member of the Dental Society of the State of New York in 1871, and continued in active membership up to the time of his death. He was elected secretary of that society in 1875 and served in that office till 1882; he was temporary treasurer in 1907 and a member of the fellowship committee from 1907 until the time of his death. He also became a member of the American Dental Association in 1880, and continued in active membership in that association and its successor, the National Dental Association, and was rarely found absent from any of the meetings until advancing years made attendance impossible. Indeed, his record of fidelity and devotion to all his society relationships is a worthy example to the young practitioner of today, upon whom must of necessity fall the burden of carrying on the work commenced by such men as Dr. Freeman and others who have devoted so many years of conspicuously active and faithful services, and to whom we are indebted for so much that is worthy and valuable in our profession today.

In 1856 Dr. Freeman married Miss Louise W. Grey of Buffalo, N. Y., and he is survived by one daughter, Miss Cora, and one son Samuel A., Jr., both of Buffalo, N. Y. In his home life Dr. Freeman was simple and beautiful as became the man, he being surrounded by many rare works of art and literature, and it was seemingly his chief delight to dispense hospitality in his home to those to whom he gave his friendship.

Soon after coming to Buffalo Dr. Freeman united with the North Presbyterian Church, in which he took an active interest up to the time of his death, and in which for more than a quarter of a century he was an office-bearer and a member of the official board, and often represented the church in the higher ecclesiastical bodies.

In civic affairs he was an upright and public-spirited citizen, and in a modest way lent his influence politically to what seemed to be best for the city, state, and nation.

A good man has fallen, and while those of us who knew him well keenly feel our loss, yet we cannot but rejoice in his splendid record of achievement, covering a long and useful life.

D. J. Main,
F. W. Low,
W. A. Barrows,
C. S. Butler, *Committee,*
Buffalo Dental Association and Eighth District Dental Society.

"IN MEMORIAM" RESOLUTIONS.

Dr. J. C. Corcoran.

The following preamble and resolutions have been adopted by the Minnesota State Dental Association relative to the death of their distinguished *confrère:*

On December 11, 1911, occurred the death of Dr. J. C. Corcoran, one of the foremost men of our profession in the state. He was born in 1863 in Corcoran, Minn., a town named after his father, was graduated with honor from the College of Ohio State in 1886, and has since been considered one of our best operators. His loss has been felt keenly by the profession, and the following resolutions in appreciation of him have been drawn up by the Minnesota State Dental Association:

Whereas, it has pleased Almighty God in his providence to remove from our midst and from this earth our esteemed brother Dr. J. C. Corcoran, who departed this life December 11, 1911; and

Whereas, by his death the commonwealth has lost a citizen of the highest type and the profession an eminent and highly respected member, who throughout his career was among the foremost in working for the advancement of his fellow man; and

Whereas, by his death the Minnesota State Dental Association has sustained an irreparable loss; therefore be it

Resolved, That we, the Minnesota State Dental Association, feeling keenly the loss we have sustained, hereby express our sorrow over the sudden culmination of Dr. J. C. Corcoran's noble career; and be it further

Resolved, That a copy of these resolutions be spread upon the minutes of the association, and a copy sent to the bereaved family and also to the journals for publication.

F. J. Yerke,
G. F. Andrews,
J. M. Walls,
Committee.

Brief Necrology.

Dr. Ernest E. Badgley of Fresno, Cal., on December 11, 1911, in his thirty-fourth year.

Dr. James S. Stevens of Shenandoah, Iowa, on January 8, 1912, of Bright's disease, in his fifty-sixth year.

Dr. J. M. Hurtt of Pomona, Cal., on January 12, 1912, in his seventy-first year. Deceased was a veteran of the civil war.

Dr. Ezekiel DuBois of Columbus, Ohio, on December 14, 1911, of old age, in his seventy-seventh year. Deceased was a veteran of the civil war.

Dr. Philip J. Koonz of New York city, N. Y., on January 9, 1912, in his sixty-eighth year. Deceased was a graduate of the New York College of Dentistry.

Dr. ZACHARIAH T. WAUGAMANN of Manor, Pa., on January 2, 1912, in his sixty-sixth year. Deceased was a graduate of the Pennsylvania College of Dental Surgery.

Dr. JOSEPH P. CROWE of Chicago, Ill., on January 20, 1912, by an accident, in his thirty-seventh year. Deceased was a graduate of the Chicago College of Dental Surgery.

Dr. GUSTAVE H. ADLER of New York city, N. Y., on January 16, 1912, of diabetes, in his sixty-second year. Deceased was a graduate of the New York College of Dentistry.

Dr. FRANKLIN J. GOSTELOW of Prophetstown, Ill., on November 12, 1911, of pneumonia, in his fortieth year. Deceased was a graduate of the Chicago College of Dental Surgery.

Dr. JOHN S. MARSH of Chicago, Ill., on January 18, 1912, in his seventy-ninth year. Deceased was a graduate of the old Columbian Dental College of Chicago, and at one time dean thereof.

Dr. WALTER H. KOST of St. Paul, Minn., on January 20, 1912, of tuberculosis, in his twenty-fifth year. Deceased was a graduate of the Dental School of the Northwestern University, Evanston, Ill.

Dr. SAMUEL LEGRANDE CRANE of Hartford, Conn., on January 17, 1912, of heart disease, in his eighty-second year. Deceased was among the first dental practitioners to use nitrous oxid as an anesthetic in dental operations.

Dr. FRANK GILBERT WORTHLEY of Kansas City, Mo., on December 26, 1911, of heart failure, in his fifty-first year. Deceased was professor of dental pathology and therapeutics in the Western Dental College of Kansas City, ex-president of the Missouri State Dental Association and the Kansas City Dental Association, member of the Kansas, Oklahoma, and Southwest Missouri District dental societies, and associate editor of the *Western Dental Journal.*

SOCIETY NOTES AND ANNOUNCEMENTS.

DENTAL SOCIETY MEETINGS:

March, April, and May.

MARCH.

MINNEAPOLIS DENTAL SOCIETY. Minneapolis. Two days: March 22d and 23d.

OKLAHOMA STATE DENTAL ASSOCIATION. Oklahoma City. Six days: March 25th to 30th.

PIEDMONT (S. C.) DISTRICT DENTAL SOCIETY. Piedmont. March 26th.

SOUTHWESTERN NEBRASKA DENTAL SOCIETY. Alma. March 14th.

APRIL.

AMERICAN DENTAL SOCIETY OF EUROPE. Brussels, Belgium. Three days: April 5th, 6th, and 8th.

CONNECTICUT STATE DENTAL ASSOCIATION. Bridgeport. Two days: April 16th and 17th.

FIFTH DISTRICT (N. Y.) DENTAL SOCIETY. Syracuse. Three days: April 4th to 6th.

KANSAS STATE DENTAL ASSOCIATION. Salina. Three days: April 23d to 25th.

ODONTOLOGICAL SOCIETY OF WESTERN PENNSYLVANIA. Pittsburgh. Two days: April 9th and 10th.

MAY.

ILLINOIS STATE DENTAL SOCIETY. Springfield. Four days: May 14th to 17th.

INDIANA STATE DENTAL ASSOCIATION. Indianapolis. Three days: May 21st to 23d.

IOWA STATE DENTAL SOCIETY. Des Moines. Four days: May 7th to 10th.

KENTUCKY STATE DENTAL ASSOCIATION. Louisville. Three days: May 27th to 29th.

LAKE ERIE (PA.) DENTAL ASSOCIATION. Cambridge Springs. Three days: May 23d to 25th.

NEW YORK STATE DENTAL SOCIETY. Albany. Three days: May 9th to 11th.

NORTH DAKOTA DENTAL ASSOCIATION. Grand Forks. Two days: May 14th and 15th.

South Dakota State Dental Society. Sioux Falls. Two days: May 14th and 15th.

Texas State Dental Association. Abilene. Three days: May 2d to 4th.

Vermont State Dental Society. Burlington. Three days: May 15th to 17th.

Examiners' Meetings.

Massachusetts Board of Registration. Boston. March 6th to 8th.

New Jersey Board of Registration. Trenton. June 24th to 26th.

Texas Board of Examiners. Houston. June 10th.

ASSOCIATION INTERNATIONALE DE PERFECTIONNEMENT SCIENTIFIQUE.

Ninth Congress.

The Ninth Annual Congress of the Association Internationale de Perfectionnement Scientifique (A. P. M.), under the patronage of the French government, will be held from August 3 to 31, 1912, in the Balkan States, Turkey, and Greece.

The Congress will be opened in Evian-les-Bains or Thonon-les-Bains (Lake of Geneva), and will proceed in the following order: Venice (via Simplon), Trieste, Adelsberg Caves, Agram, Belgrade, Danube Rapids, Kasan Defile, Iron Gate, Bucharest, Sophia, Constantinople, Mytilene, Smyrna, Athens, Phalerum, Eleusis, Corinth, Olympia, Corfu, Bologna (via Brindisi). The last meeting will be held at Aix-les-Bains.

Those wishing to present papers or reports on subjects pertaining to general or special medicine and surgery and allied sciences, hygiene in all its branches, prophylaxis, and charity, are requested to notify the central office.

The program of the congress will be published in the January issue of the Association's *Review*. A copy of this special number will be forwarded on application, if accompanied with a money order for 1s. 4d.

For further particulars address the president, Main Office A. P. M., 12 Rue François-Millet, Paris XVI, inclosing 2½d. in international return postage, or call at the office Wednesday or Saturday between 3 and 4 P.M.

Dr. Ghislain Houzel, *Sec'y-general.*

AMERICAN DENTAL SOCIETY OF EUROPE.

The thirty-ninth annual meeting of the American Dental Society of Europe will be held at the Palace Hotel, in Brussels, April 5, 6, and 8, 1912. An interesting program will be furnished, and a cordial invitation is extended to members of the profession to be present.

Geo. H. Watson, *Hon. Sec'y,*
Pariser Platz 7, Berlin, Ger.

NATIONAL DENTAL ASSOCIATION.

Manufacturers' Exhibit.

The manufacturers' exhibit during the convention of the National Dental Association in Washington, September 10 to 13, 1912, inclusive, will be held in the New Ebbitt Hotel, which is just across the street from the headquarters and the clinics. Specifications, plans, rates, and full information can be had by addressing

Clyde M. Gearhart, *Ch'man Exhibit Com.,*
1616 I st., N. W., Washington, D. C.

CANADIAN DENTAL SOCIETY AND ONTARIO DENTAL ASSOCIATION.

Union Meeting.

A union meeting of the Canadian Dental Society and Ontario Dental Association will be held at Hotel Brant, Hamilton, Ont., June 3, 4, 5, and 6, 1912.

J. A. C. Hoggan.

PIEDMONT (S. C.) DISTRICT DENTAL SOCIETY.

The next regular tri-annual meeting of the Piedmont District Dental Society will be held in Piedmont, S. C., March 26, 1912. All of the time will be devoted to clinics with the exception of a short business meeting, at which anyone who wishes may ask the society such questions as, How do you treat abscessed deciduous teeth? or, How would you treat a tooth with a Richmond crown cemented to position with an abscess under it? etc.

Clinics will begin promptly at 9 A.M.

W. Busey Simmons, *Sec'y-Treas.*

SOUTHWESTERN NEBRASKA DENTAL SOCIETY.

The annual meeting of the Southwestern Nebraska Dental Society will be held at Alma, Nebr., March 14, 1912. A good program is promised by the Executive Committee, who have arranged to have three men from outside the district to meet with the district men and give papers and clinics.

W. A. McHenry, *Sec'y*,
Nelson, Nebr.

MINNEAPOLIS DENTAL SOCIETY.

Annual Clinic.

The Minneapolis Dental Society will have a two days' meeting on March 22d and 23d. The program for the first day will be extensive chair and table clinics and a lantern-slide lecture in the evening. The second day's program will be devoted entirely to clinics by professional talent from out of the city.

An extensive manufacturers' exhibit will be held in the same hall on both days.

Any further information regarding this meeting may be obtained from

O. DeForest Davis, *Sec'y*,
404 Donaldson Bldg., Minneapolis.

ODONTOLOGICAL SOCIETY OF WESTERN PENNSYLVANIA.

The Odontological Society of Western Pennsylvania will hold its annual meeting on Tuesday and Wednesday, April 9 and 10, 1912, at the Monongahela House, Pittsburgh, Pa.

Drs. Matthew S. Cryer of the University of Pennsylvania, M. H. Fletcher of Cincinnati, Ohio, and T. H. Terry of Cleveland, as well as many local men, will present papers for the occasion.

The clinics will be of the usual high character. Exhibitors desiring space for this meeting will kindly communicate with

Jos. N. Katz,
1317 Fifth ave., Pittsburgh, Pa.
O. L. Hertig,
Wm. W. Booth,
Program Committee.

KANSAS STATE DENTAL ASSOCIATION.

The forty-first annual convention of the Kansas State Dental Association will be held in the city hall at Salina, Kans., April 23, 24, and 25, 1912.

S. S. Noble, *President*,
Wichita, Kans.

CONNECTICUT STATE DENTAL ASSOCIATION.

The forty-eighth annual convention of the Connecticut State Dental Association will be held in The Stratfield, at Bridgeport, April 16 and 17, 1912.

A. V. Prentis, *Sec'y*,
New London, Conn.

VERMONT STATE DENTAL SOCIETY.

The next meeting of the Vermont State Dental Society will be held at Hotel Vermont, Burlington, Vt., May 15 to 17, 1912. The opening session will be on Wednesday at 2.30 p.m.

Harry F. Hamilton, *Sec'y*,
Newport, Vt.

OKLAHOMA STATE DENTAL ASSOCIATION.

The Oklahoma State Dental Association will meet this year March 25 to 30, 1912, at Oklahoma City. The new feature of the meeting will be a post-graduate course of five days, given by Drs. Buckley, Goslee, and Dettmar of Chicago, who will issue a certificate to all who take the course. Any member of the state association is elegible who is in good standing, and whose dues—which are $5—are paid; any dentist outside of the state can take the course by paying $10.

We expect a large exhibit, and extend a special invitation to all ethical dentists of the United States.

For any information, address the following: C. R. Lawrence (president), Enid, Okla. A. L. Walters (secretary), Checotah, Okla. B. L. Shobe (chairman post-graduate committee), Bartlesville, Okla. R. S. Parsons (chairman program committee), Oklahoma City, Okla. E. S. Gum (supervisor of clinics), Oklahoma City, Okla.

LAKE ERIE (PA.) DENTAL ASSOCIATION.

THE forty-ninth annual meeting of Lake Erie Dental Association will be held at Hotel Bartlett, Cambridge Springs, Pa., May 23, 24, and 25, 1912.

C. L. MEAD, *Sec'y*,
Union City.

ILLINOIS STATE DENTAL SOCIETY.

THE forty-seventh annual meeting of the Illinois State Dental Society will be held at Springfield, May 14, 15, 16, and 17, 1912.

J. F. F. WALTZ, *Sec'y*,
Decatur, Ill.

NORTH DAKOTA DENTAL ASSOCIATION.

THE seventh annual meeting of the North Dakota Dental Association will be held at Grand Forks, N. D., May 14 and 15, 1912.

E. N. HEGGE, *Sec'y*,
Hatton, N. D.

IOWA STATE DENTAL SOCIETY.

GOLDEN ANNIVERSARY.

THE fiftieth annual meeting of the Iowa State Dental Society will convene at Des Moines, Iowa, May 7, 8, 9, and 10, 1912, beginning Tuesday, May 7th, at 9 A.M.

The Coliseum, with its large floor space, has been secured for clinics, exhibits, and lectures.

A special effort is being made to have all the old members who are alive present, and Thursday will be given over to the older dentists and ex-Iowa practitioners as a home-coming event, to exhibit, lecture, clinic, and banquet, and all are urged to attend. An historical paper is being prepared by Dr. J. B. Monfort of Fairfield, and pictures of early practitioners will be shown. This we expect to be one of our most interesting days.

The exhibits will be the largest ever given by any state society. Complete and extensive modern dental equipments, appliances, and instruments will be shown and demonstrated, and in contrast a large exhibit will be made of equipment, appliances, instruments, etc., of fifty years ago, that will be highly interesting and educational, and will be in charge of Dr. A. D. Clark of Charles City, Iowa, who would be pleased to correspond with anyone who might add to this exhibit. The modern exhibits will be in charge of Dr. H. A. Elmquist, master of exhibits, Des Moines, Iowa, to whom application for space should be made at an early date.

Further information will be furnished upon request from ethical practitioners of other states contemplating a visit to the meeting and to whom we extend a cordial invitation.

C. M. KENNEDY, *Sec'y*,
605 Citizen's Nat'l Bank,
Des Moines, Iowa.

SOUTH DAKOTA STATE DENTAL SOCIETY.

THE thirtieth annual meeting of the South Dakota State Dental Society will be held at Sioux Falls, May 14 and 15, 1912. Adoption of a new constitution and by-laws will take place at this meeting.

J. D. DONAHOE, *Sec'y*,
Sioux Falls, S. D.

TEXAS STATE DENTAL ASSOCIATION.

THE thirty-second annual meeting of the Texas State Dental Association will be held at Abilene, Texas, May 2, 3, and 4, 1912. Exhibitors desiring space will please address Dr. C. M. McCauley, Abilene, Texas. The clinics will be in charge of Dr. J. O. Hall, Waco, Texas, who will furnish any information relative to same.

All ethical practitioners are cordially invited to attend the meeting, and will be cheerfully furnished any other information by the secretary.

H. M. DAVISON, *President*,
Hubbard, Texas.
J. G. FIFE, *Sec'y*,
736 Wilson Bldg., Dallas, Texas.

INDIANA STATE DENTAL ASSOCIATION.

THE fifty-fourth annual meeting of the Indiana State Dental Association will be held at the Claypool Hotel, Indianapolis, Ind., May 21, 22, and 23, 1912.

W. W. Shryock, supervisor of clinics, promises the greatest clinic ever held in the state. W. E. Kennedy, executive committeeman, has already perfected a grand program, having secured the promise of papers from some of the best men in the dental profession. Carl Lucas, master of exhibits, has already almost the entire eighth floor of the Claypool Hotel reserved by the dental exhibitors.

This meeting will go down in the history of the association as a landmark, because of the large number of new members—our slogan "1000 members in 1912."

No dentist or exhibitor who wants to attend one of the very best meetings that will be held in 1912 can afford to miss the Indiana State dental meeting this year. You will be welcome.

OTTO U. KING, *Sec'y*,
Huntington, Ind.

FIFTH DISTRICT (N. Y.) DENTAL SOCIETY.

THE forty-fourth annual meeting of the Fifth District Dental Society of the State of New York will be held at the Onondaga Hotel, Syracuse, N. Y., April 4, 5, and 6, 1912. All ethical members of the profession are cordially invited to attend.

J. N. GARLINGHOUSE, *Sec'y*.

NEW YORK STATE DENTAL SOCIETY.

THE forty-fourth annual meeting of the New York State Dental Society will be held at Albany, N. Y., in the Hotel Ten Eyck, May 9, 10, and 11, 1912.

Instructive papers have been secured, and the Clinic Committee will unquestionably present a fine list of clinics. (No clinics will be honored after March 20, 1912.) A special effort in behalf of exhibitors—for their comfort and sufficient space for exhibits—will be made by the Exhibit Committee. Address at once Dr. O. J. Gross, Schenectady, N. Y.

A cordial invitation is extended to all ethical dentists.

A. P. BURKHART, *Sec'y*,
52 Genesee st., Auburn, N. Y.

NEW HAMPSHIRE DENTAL SOCIETY.

THE annual meeting of the New Hampshire Dental Society will be held at Hotel Weirs, Weirs, N. H., June 19, 20, and 21, 1912. All members of the profession are cordially invited to be present.

FRED F. FISHER, *Sec'y*,
Manchester, N. H.

PENNSYLVANIA STATE DENTAL SOCIETY.

THE forty-fourth annual meeting of the Pennsylvania State Dental Society will be held in Carnegie Music Hall, Pittsburgh, June 11, 12, and 13, 1912. A program of exceptional interest is being prepared.

LUTHER M. WEAVER, *Recording Sec'y*.

KENTUCKY STATE DENTAL ASSOCIATION.

THE meeting of the Kentucky State Dental Association will be held in Louisville, May 27, 28, and 29, 1912. A special attraction, consisting of talented men from out of the state, will be upon the program this year, and every indication points to the best state meeting that has been held for many years. The dentists in Kentucky are especially invited and a special invitation is extended to all ethical members of the profession.

W. M. RANDALL, *Sec'y*,
Louisville, Ky.

MINNESOTA STATE DENTAL ASSOCIATION.

THE twenty-ninth annual meeting of the Minnesota State Dental Association, which will be held in St. Paul, Minn., June 14 and 15, 1912, promises to be the largest in the history of the organization. The large clinic and manufacturers' exhibit will occupy the entire top floor of the new Lowry Building, the largest and best equipped dental and medical building in the West.

At that time of the year the Twin Cities, with their wealth of parks and beautiful lakes, afford an ideal spot for a vacation, and the business and instruction of the meeting may well be combined with the recreation so necessary to our profession.

For information address

BENJAMIN SANDY, *Sec'y*,
636 Syndicate Bldg, Minneapolis, Minn.

RUTLAND (VT.) COUNTY DENTAL SOCIETY.

ON Tuesday evening, January 9, 1912, the dentists of this vicinity met and organized the Rutland County Dental Society.

A constitution, by-laws, and code of ethics were adopted, and the following officers were elected: William R. Pond, president; Percy M. Williams, vice-president; Grace L. Bosworth, secretary and treasurer.

The meeting was an enthusiastic one, and nearly every dentist in the county has signified his intention of joining the society; meetings will be held once a month.

This is the first county society to be organized in Vermont. All members of this society must either be members of the state society or have signified their intention of joining. The local society hopes to bring about among other things a wholesome interest and growth in the state organization.

Grace L. Bosworth, *Sec'y*,
Rutland, Vt.

MASSACHUSETTS BOARD OF REGISTRATION.

A meeting of the Massachusetts Board of Registration in Dentistry, for the examination of candidates, will be held in Boston March 6, 7, and 8, 1912.

For application blanks and further information apply to

G. E. Mitchell, *Sec'y*,
14 Water st., Haverhill, Mass.

TEXAS BOARD OF EXAMINERS.

The next meeting of the Texas State Board of Dental Examiners, for the purpose of examining applicants for a license to practice dentistry and dental surgery in the State of Texas, will be held in Houston, Texas, beginning June 10, 1912, at 9 A. M.

For application blanks and any further information address

J. M. Murphy, *Sec'y*.
Temple, Texas.

NEW JERSEY BOARD OF REGISTRATION.

The State Board of Registration and Examination in Dentistry will hold their semiannual meeting in the Assembly Chamber of the State-house at Trenton, N. J., June 24, 25, and 26, 1912; practical work on the 24th.

Application must be on hand one week prior to the examination.

Charles A. Meeker, *Sec'y*,
29 Fulton st., Newark, N. J.

EXAMINATION OF DENTISTS FOR THE ARMY.

The Surgeon-general of the Army announces that examinations for the appointment of acting dental surgeons will be held at Fort Slocum, N. Y., Columbus Barracks, Ohio, Jefferson Barracks, Mo., Fort Logan, Colo., and Fort McDowell, Cal., on Monday, April 1, 1912.

Application blanks and full information concerning these examinations can be procured by addressing the Surgeon-general U. S. Army, Washington, D. C.

The essential requirements to securing an invitation are that the applicant shall be a citizen of the United States, shall be between twenty-one and twenty-seven years of age, a graduate of a dental school legally authorized to confer the degree of D.D.S., and shall be of good moral character and habits.

Acting dental surgeons are employed under a three-years' contract, at the rate of $150 per month. They are entitled to traveling allowances in obeying their first orders, in changing stations, and in returning to their homes at termination of service. They also have the privilege of purchasing certain supplies at the army commissary. After three years' service, if found qualified, they are promoted to the grade of dental surgeon, with the rank of first lieutenant, and receive thereafter the pay and allowances appertaining to that rank.

In order to perfect all necessary arrangements for the examination, applications must be in the possession of the Surgeon-general at least two weeks before the date of examination. Early attention is therefore enjoined upon all intending applicants. There are at present twenty-nine vacancies to be filled.

ARMY DENTAL SURGEONS.

Memoranda of Changes.

For the week ending January 20, 1912:

Geo. E. Stallman, January 8th, reports for temporary duty at Fort Clark, Texas.

Chas. E. Sherwood (*act'g*), January 6th, reported for duty at Presidio of Monterey, Cal.

Raymond E. Ingalls, January 12th, ordered to proceed from temporary duty at Fort Missoula, Mont., to Boise Barracks, Idaho, for temporary duty.

James F. Feely (*act'g*), January 16th, reports for temporary duty at Fort Hancock, N. J.

George L. Mason, January 8th, reported for temporary duty at Fort Des Moines, Iowa.

For the week ending January 27th:

Franklin F. Wing, January 12th, ordered to return to Fort D. A. Russell, Wyo., upon completion of temporary duty at Fort Robinson, Nebr.

Charles J. Long, January 18th, returned to Fort Andrews, Mass., from duty as witness general court-martial, Manila, P. I.

G. E. Stallman, January 19th, left Fort Clark, *en route* to Fort McIntosh, Texas, for temporary duty.

Franklin F. Wing, January 21st, returned to Fort D. A. Russell, Wyo., from temporary duty at Fort Robinson, Nebr.

G. E. Stallman, January 22d, reported for temporary duty at Fort McIntosh, Texas.

For the week ending February 3d:

R. E. Ingalls, January 17th, reported for temporary duty at Boise Barracks, Idaho; left from temporary duty at Fort Missoula, Mont., January 15th.

For the week ending February 9th:

Clarence E. Lauderdale, February 3d, will proceed to the Walter Reed General Hospital, D. C., for observation and treatment.

J. F. Feely (*act'g*), February 2d, left Fort Hancock, N. J., *en route* to Fort Wadsworth, N. Y., for temporary duty. Reported at Fort Wadsworth same date.

Frank P. Stone, February 1st, reported for temporary duty at Fort McPherson, Ga.

G. E. Stallman, February 2d, left temporary duty at Fort McIntosh, Texas, *en route* for temporary duty at Fort Sill, Okla.

Charles J. Long, February 6th, left Fort Andrews, Mass., *en route* home to Rock Island, Ill., his resignation having been accepted this date.

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UNITED STATES PATENTS

PERTAINING OR APPLICABLE TO DENTISTRY

ISSUED DURING JANUARY 1912.

January 2.

No. 1,013,111, to Ernest Clifford Bennett. Artificial denture.

No. 1,013,666, to John P. Lederle. Process of making dental inlays.

January 9.

No. 1,013,940, to Fernando Oscar Jaques. Dental press.

No. 1,013,993, to Frank A. Gough. Dental tooth-regulating appliance.

No. 1,014,028, to Edward H. Angle. Dental tooth-regulating appliance.

No. 1,014,029, to Edward H. Angle. Dental tooth-regulating and retaining appliance.

No. 1,014,030, to Edward H. Angle. Dental tooth-regulating appliance.

No. 1,014,056, to Charles Lamb Gibbs. Dentimeter.

No. 1,014,348, to George W. Todd. Artificial tooth.

No. 1,014,428, to Sylvester S. Whetstone. Tooth-facing attaching device.

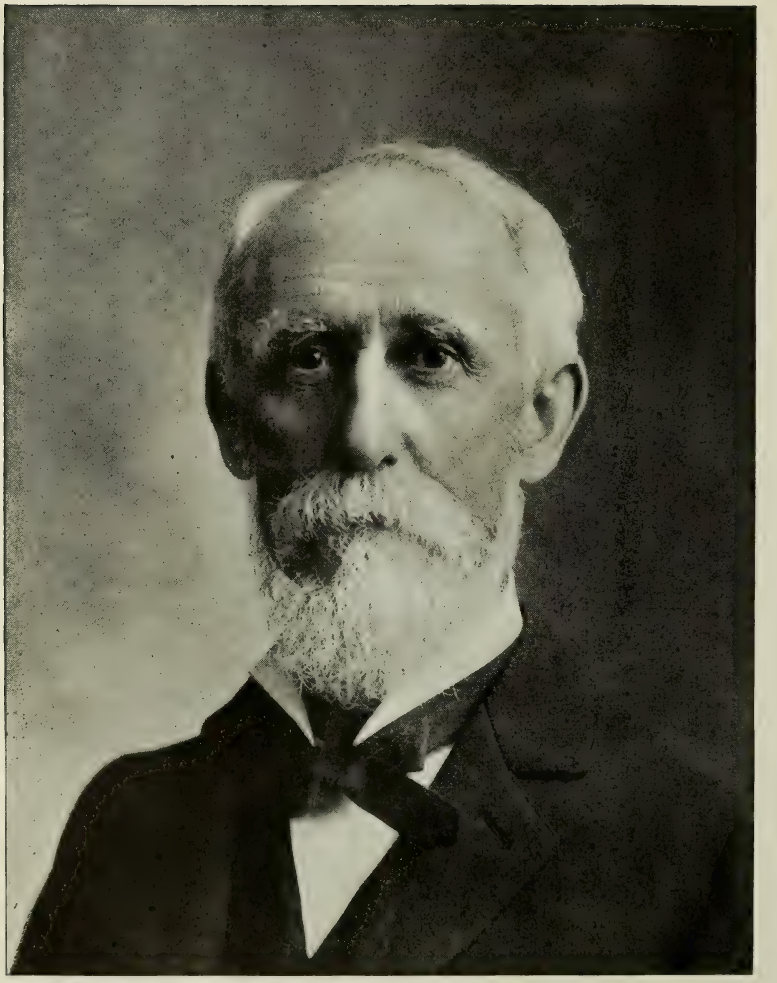
No. 1,014,594, to George B. Kakins. Tooth-cleaning device.

January 16.

No. 1,015,039, to Vincent Lasbury. Dental tool.

January 30.

No. 1,016,128, to Alonzo C. Buttman. Artificial tooth plate.



DR. SAMUEL A. FREEMAN.

[See March issue, page 388.]

THE

DENTAL COSMOS.

VOL. LIV. APRIL 1912. No. 4.

ORIGINAL COMMUNICATIONS.

ON THE THERAPEUTIC ACTION OF PHENOL-SULFONIC ACID.

By HERMANN PRINZ, M.D., D.D.S., St. Louis, Mo.

FROM THE RESEARCH LABORATORY OF WASHINGTON UNIVERSITY DENTAL SCHOOL.

WHEN Wöhler of Göttingen, in 1828, announced the fact that he had prepared urea by a synthetic process, his discovery marked a new era in the production of synthetic medicinal agents, and ever since that the manufacturing chemists have been busy seeking to introduce such new compounds for therapeutic purposes. Within the last fifty years the output of these new remedies has reached such an enormous extent that it is fairly impossible for the average practitioner to keep pace with the rapid growth of pharmaceutic creations. Fortunately, most of these supposed remedies disappear before they become generally known; others struggle through a short-lived existence, while a few only prove to possess real merit and become permanent members of our armamentarium. The busy practitioner has rarely the time or the inclination to enter into a detailed study of these new compounds; still oftener he lacks the facilities to do so, or he does not possess the proper training even if he wishes to make an investigation. To the sober-minded observer it has soon dawned that many of these recently introduced products were backed solely by the naturally much-biased indorsements of the manufacturers, or they were "written up," to express it in newspaper vernacular, to satisfy some personal motive. Ofttimes these reports are filled with speculative conceptions; truth and poetry are so deftly interwoven that the inattentive reader becomes hypnotized by the smoothly flowing language of the fairy-tale. In many instances the indorsement of a new remedy is solely based upon empiric evidence deduced from clinical observation. While we are in full accord with what Huxley once said—that "All true science begins with empiricism, although all science is science for the reason that it strives to pass out of the empirical stage"—yet pure empiricism as far as drug action is concerned is not justifiable at the present day. We are highly appreciative of the true value of clinical observations, but we do not regard such observations as the only criterion concerning the pharmacologic action of a new drug or drug compound. To laud a remedy as possessing specific medicinal qualities or to stamp it as being a veritable panacea in certain diseases with no other evidence than clinical observations is not in accordance with the laws governing pharmacologic research. Pharmacology is a department of biology, and, as a consequence, the same methods of research which govern the mother science are applicable to all its branches.

METHODS OF RESEARCH.

In regard to an investigation into a remedy or, for that matter, any biologic problem, the following four rules of research must be observed:

(1) Generally known observations or facts are collected.

(2) Hypotheses are drawn from these observations and are explained.

(3) Other crucial facts (experiments) are collected to test these hypotheses, and

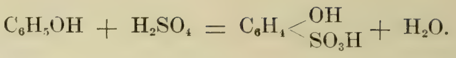
(4) A second set of facts is collected, and from it are drawn the final conclusions or verifications.

Omitting one of these rules or applying illogical reasoning based on analogy, or inductive instead of deductive methods, leads to a false analysis of the problem under consideration.

The introduction of phenol-sulfonic acid into dental therapeutics offers a striking example of speculative conclusions as drawn from clinical observations only. In the following discussion an effort is made to explain the therapeutic action of this compound on a rational basis.

CHEMISTRY OF PHENOL-SULFONIC ACID.

When phenol is treated with sulfuric acid, an acid radical is substituted for an H in the C_6H_5OH of the phenol, and a new compound is formed which is known as phenol-sulfonic or sulfo-carbolic acid. The reaction may be explained by the following equation:



$$C_6H_5OH + H_2SO_4 = C_6H_4{<}\begin{matrix}OH\\SO_3H\end{matrix} + H_2O.$$

Depending upon the mode of procedure, theoretically three types of phenol-sulfonic acid may be obtained—the *ortho,* the *meta,* and the *para* acid. By treating phenol directly with sulfuric acid, only the ortho or the para acid is formed, while the production of the meta acid requires a more complicated procedure. The ortho acid is formed when phenol and sulfuric acid are brought together at a low temperature, while by subjecting this same mixture to prolonged heating the pure para acid is formed. The various acids thus obtained always contain a variable small amount of free sulfuric acid. For practical purposes, the ortho-phenol-sulfonic acid may be prepared in the following way: 102 grams of sulfuric acid (96 per cent.) are weighed out in a porcelain capsule, and 94 grams of pure phenol, previously liquefied by gentle heat, are gradually added under constant stirring with a glass rod. The mixture must be kept at as low a temperature as possible to avoid the formation of the para acid. The acid is set aside for a few days, after which time the reaction is practically completed. A small amount of para acid is usually formed along with the ortho acid. To produce the para-phenol-sulfonic acid, the two acids are mixed in the same proportions and are kept at a temperature of about 100° C. for a few hours, after which time the almost pure para acid has formed. Commercially, a 33⅓ per cent. solution of ortho-phenol-sulfonic acid in water is known as aseptol; this solution is also referred to as socolic acid.

Phenol-sulfonic acid (the ortho or the para acid) is a syrupy, yellowish liquid, becoming darker with age and having a pronounced acid reaction. It is readily soluble in water, alcohol, and glycerin, but insoluble in ether, chloroform, and some oils. It is practically odorless, or only feebly so, resembling phenol. It should be kept in glass-stoppered bottles, protected from light.

The various brands of phenol-sulfonic

acid as obtained from the dealers vary greatly in their composition. Merck supplies a phenol-sulfonic acid which is a mixture of the ortho and the para acids, having a thin syrupy consistence; the para phenol-sulfonic acid as supplied by Lily according to Buckley's formula, is a very thick, heavy liquid, while some other makes are of variable composition.

THERAPEUTICS.

Phenol-sulfonic acid was introduced into chemistry some forty years ago by Laplace and Kékulé, and since that time Annesen, Fraenkel, Vigier, Serrant, Hueppe, Schneider, and others have worked out its therapeutic value. It was soon found, however, that it possessed no demonstrable advantage over sulfuric acid, hence it was quickly discarded by the medical profession. Dentistry owes its re-introduction principally to Buckley, Cook, and MaWhinney. When phenol-sulfonic acid is applied in weak aqueous solutions it acts primarily as an antiseptic; in concentrated form it is a caustic. Solutions in alcohol or glycerin largely nullify these effects. Many additional virtues are claimed for this compound—for instance, it is said that it is a "bone-cell stimulant," and that it is indicated in the treatment of chronic alveolar abscess, necrosis of bone, pyorrhea alveolaris, and similar affections. These claims are based apparently on clinical observations only, as no experimental proof is offered for their substantiation. Practically, these various indications signify that it is advocated as a substitute for sulfuric acid with the hope that its phenol content may play some mysterious part.

When a sulfon radical is anchored to a phenol molecule, the toxicity of the latter is altered. The poisonous effect of phenol depends primarily on the presence of the hydroxyl group OH. Since phenol is only weakly ionized, it is not the phenol ion C_6H_5O alone which is active, but the whole molecule C_6H_5OH is required for its typical poisonous effect. By changing the OH group, as for instance by the introduction of alkalis, salts are formed—the phenolates—which are much weaker than the original phenol. If, on the other hand, an acid, *i.e.* sulfuric acid, is attached to the phenol, the sulfonic acid group SO_3H is formed, which slightly increases its poisonous effect. Again, if the salts of this latter acid are formed—the phenol sulfonates—they are also markedly less toxic than the acid.

The action of phenol-sulfonic acid, as stated above, may be defined as being antiseptic in a weak solution and caustic when applied in a concentrated solution. Incidentally it acts as an astringent on account of its sulfuric acid content. Regarding the action of antiseptics, astringents, and caustics, it should be remembered that these various pharmacologic conceptions are very closely related to each other, and that it is often merely a question of quantity, *i.e.* concentration, of the respective solution, and *not* of quality, that governs the primarily desired effect. From the very nature of the composition of phenol-sulfonic acid, its primary action on living soft tissue manifests itself as a protoplasm poison, *i.e.* it precipitates the proteins, forming an eschar which is ultimately cast off. When brought into contact with bone or tooth structures its action depends largely upon the nature of its composition. The ortho acid acts purely as a rapid decalcifier, leaving the swelled organic matrix of the bone or tooth substance intact, while the para acid acts somewhat like sulfuric acid, *i.e.* it destroys the structures *in toto,* only to a much milder degree. Sulfuric acid acts principally as a caustic. It precipitates the proteins of the soft tissues, forming a white eschar which ultimately becomes black by carbonization. When brought in contact with bone or tooth structure it kills the organic content, removes the water present, breaks up the organic material by forming water from the liberated oxygen and hydrogen, leaving ultimately nothing but carbon. The calcium salts are simultaneously dissolved and removed with the organic matrix. Its action is much more rapid on dead bone or tooth structure.

When we compare the action of a protoplasm poison to that of a caustic, it should be remembered that there is a vital difference between the two phenomena. Pure chemic drug action on living cell structure which endangers or even kills the cell without visible changes is referred to as protoplasm poisoning, while caustic action means direct or indirect destruction of the protoplasm, producing chemic or physical changes in the tissues which are macroscopically recognizable.

In regard to the antiseptic action of phenol-sulfonic acid, the experimental work of Hueppe, Vigier, Serrant, Schneider, and others has clearly demonstrated the important fact that of the three types of phenol-sulfonic acid, the ortho acid is the most active, and the para acid is the weakest, while the meta acid stands intermediate between the two. This fact is of importance to remember, since it is contrary to the conception which is prevalent in current American dental literature. It is usually stated that the para acid, which is the acid obtained when prepared according to the method as suggested by Buckley, is the most active. According to Schneider, the ortho-phenol-sulfonic acid is three times as effective as the para acid (a pure culture of staphylococci being used as the test organism). A 1 per cent. solution of ortho-phenol-sulfonic acid is equal in its antiseptic power to a 1 per cent. solution of phenol, while, consequently, a 1 per cent. solution of para acid is approximately three times less effective. However, as a general antiseptic, even in less than a 1 per cent. solution, it cannot be used in the oral cavity, on account of its pronounced acidity and the consequent danger to both the soft and the hard structures. Its antiseptic effect, therefore, plays no part in its therapeutic application when employed for dental purposes.

EXPERIMENTAL WORK.

To test the effect of the ortho- and para-phenol-sulfonic acid on bone and tooth structure, a series of tests were made. Since the commercial acids vary greatly in their composition, both acids were prepared in our laboratory, and they were tested alongside of the commercial products for comparison. It was found, as stated above, that the ortho acid, or a mixture of ortho and para acids, acts as a rapid decalcifier of tooth structure, leaving the organic matrix in place, while the para acid destroys both the organic and inorganic constituents of the tooth. When kept in contact with tooth structure for some time, the ortho acid causes a deep brown discoloration, while the para acid does not alter the color of the dentin to any appreciable degree. These various drawbacks prohibit the use of ortho-phenol-sulfonic acid as a dental remedy.

To test the action of para-phenol-sulfonic acid as compared to sulfuric acid, given quantities of tooth structure were subjected to both acids for various periods of time. It was found that a 50 per cent. solution of sulfuric acid in distilled water acts almost within the moment of its application, producing a snow-white surface on the tooth, while the thick para acid requires at least from three to five minutes to show even the weakest impression, without materially altering the color of the dentin. Diluting the various acids to lower percentage solutions naturally reduces their activity, although not proportionally. There is no need to enter into a further discussion of these various tests; suffice it to say that a comparison of the action of the two acids, taking into consideration correct percentage solutions, time of contact, and specific quantities of tooth structure, is strongly in favor of sulfuric acid. To produce the same solvent (caustic) effect of a known quantity of a given percentage solution of sulfuric acid within a definite period of time requires at least five times as concentrated a solution of para-phenol-sulfonic acid. These experimental proofs confirm carefully conducted clinical observations—in fact, the clinically observed inefficiency of the para acid led to our experimental inquiry.

For many years past, sulfuric acid has been used as a true bone solvent (caustic) in general surgery, and it has been employed with marked success for the same purposes in dental surgery. Its greatest benefits, however, are derived from its application for the purpose of opening and enlarging root-canals, and incidentally for the destruction of pulp remnants present in these canals. Callahan, in 1893, advocated it for such purposes, and to him the dental profession is greatly indebted for having introduced this chemic procedure into operative dentistry, which marks a distinct step of progress. In his various communications Callahan has furnished experimental proof for the soundness of this conception, and long-extended clinical observations have substantiated his claims from a therapeutic point of view. The substitution of ortho- or para-phenol-sulfonic acid for this or any other purpose in which sulfuric acid is indicated in dental therapeutics means the application of a decidedly inferior remedy, and hence retrogression. In substituting new therapeutic agents for old and well-tried remedies we must go very slowly, ever bearing in mind—with Shakespeare's wisdom—that in "Striving to do better, we ofttimes mar what's well."

Regarding the application of sulfuric acid for dental diseases, it may be of interest to know that the writer has recently examined samples of two widely advertised "pyorrhea cures." One sample represented merely a diluted aromatic sulfuric acid, while the other was an aqueous solution of sulfuric acid containing various aromatic substances.

RÉSUMÉ.

(1) The phenol content of the phenol-sulfonic acid plays no active part in the therapeutic effect of the latter; the phenol is changed into a more or less inert compound by the formation of the sulfon radical.

(2) A 1 per cent. solution of ortho-phenol-sulfonic acid in water is about equal in its antiseptic strength to a 1 per cent. phenol solution. The meta and the para acids are respectively two and three times less active.

(3) A 1 per cent. solution of ortho- or para-phenol-sulfonic acid cannot be used in the mouth as a general antiseptic on account of its pronounced acidity.

(4) Pure ortho-phenol-sulfonic acid acts solely as a decalcifier of tooth structure, leaving the organic matrix intact. Incidentally, it discolors the tooth a dark brown.

(5) Para-phenol-sulfonic acid is more than five times less active as a bone solvent (caustic) than an equally concentrated percentage solution of sulfuric acid.

(6) Ortho- and para-phenol-sulfonic acid may be advantageously dispensed with in dental therapeutics.

EXCAVATION FOR PRESERVATION: A REPLY TO DR. W. R. CLACK.

By **JOHN PHILIP ERWIN**, D.D.S., Perkasie, Pa.

AFTER having read Dr. Clack's review of Dr. McCullough's paper in the January issue of the DENTAL COSMOS, I feel it my duty not to permit it to pass unnoticed.

The prime purpose of a paper should always be to establish the truth, and nothing but the truth. Criticism or credit should be meted to an author as he fails or succeeds in doing this. Too many papers and discussions appear to-day possessed and prompted by ulterior motives, while the highest motive to prompt a literary production should be a wish not to appear discourteous or vicious, but to advance the one great virtue we all should strive to possess, namely, the truth as we find it in our dental profession.

I am personally acquainted with Dr. McCullough—he, like myself, being a native of Philadelphia and a graduate of the same college. As a man, I have always found him gentle; as a student, earnest; as a dentist, far above the average in general ability.

My acquaintance with Dr. Black consists of two golden hours spent with him in his laboratory last June. I called with a letter of introduction at four o'clock in the afternoon, intending to remain not more than thirty minutes, but my short call, proving so interesting, developed into a general discussion of everything dental, until I had spent two of the happiest hours of my life. And I a dyed-in-the-wool disciple of Flagg! I can sincerely say of Dr. Black—"*Homo est.*"

A REVIEW OF DR. CLACK'S REVIEW.

As to Dr. Clack's review, I would ask the reader to open his January COSMOS, at page 25, and follow me. It should first be noted that when Dr. McCullough states a premise he supports it, not only with his own substantial proposition, but with accepted opinions of eminent authorities, all presented in logical order leading up to a definite conclusion.

Dr. Clack opens his review by attempting to ridicule his opponent with a few ill-pointed stories, savoring of the schoolroom debate and wholly foreign to the subject of extension for prevention. He then considers Dr. McCullough's paper section after section, until he has developed, almost humorously, thirty-nine varieties.

The notice of a few will suffice to display the exceptional strength of the paper discussed, and the lack of logic displayed in the discussion.

Section 1 the reviewer kindly leaves unchallenged.

Sec. 2 he substantiates.

Sec. 3. Who encourages *radical* technical procedure?

Sec. 4. The house built upon the rock can *resist* the storm that beats against it, but cannot *control* such forces. A filling can resist the forces of decay, but cannot control them.

Sec. 5. The conservation of the pulp should be a great consideration in all cavity preparation.

Sec. 6, 7. It is unfair to separate these sections, as they surely need to be considered as one statement. To the man who has been a careful, unprejudiced clinical observer, I quote the four divisions of sensitive dentin. (1) Cases with no perceptible cavity of decay. (2) Superficial caries. (3) Simple caries. (4) Deep-seated caries. The danger of encroaching upon a vital pulp or its fibrils by *fanatical* extension is an important thought in cavity preparation, and is thus connected with extension for prevention.

Sec. 8–11. Dr. Clack does not present one argument to break the truth as stated in these sections. Fanatical extension has caused the death of many pulps.

Sec. 12–16. We here find the first argument against the paper, in a tale of Chinese eggs. I can see how the histological formation of a tooth greatly bears on extension in cavity formation. "If any man can show me any connection between" these paragraphs and ancient Chinese eggs "he will do me a kindness."

Sec. 17–23. Dr. McCullough here presents such forceful arguments that the observer is compelled to retreat with such short comments as—"I cannot agree." "This statement is correct." "We will pass them over."

Sec. 24–27. No living person is completely immune from smallpox, because vaccinated and unvaccinated have had smallpox, and even those who have had the disease have had a recurrent attack. One having lived and died without this illness can be spoken of as having been *free* from smallpox. No part of an unburned city is immune to fire, because it is not free from the power of fire. Dr. McCullough debates the claim of extension creating immunity by stating that the area of immunity is that part of a tooth not decayed, thus implying that every part of a tooth is *liable* to decay, because teeth have decayed in all their parts. He presents most clearly my own views on the theory of extension. It has been my belief for many years that the dental profession has not the correct and complete solution for the question of decay of teeth. The careful observer again commits an error of extreme statement, for neither Dr. Clack nor anyone else can prove that "millions of cases" have been rendered immune by extension.

Sec. 28–30. Not debated.

Sec. 31. Dr. McCullough does not say that the lines on which an architect constructs his work, and the skill with which the work is executed have *nothing* to do with permanence. He says that there are other factors more important, such as the foundation or the structure of the tooth, the selection of building or filling materials, and the service required of the building and the location of the cavity, and as the tooth *needs saving*.

Sec. 32–39 create no special criticism.

POT-BOILERS.

After his treatment of the thirty-nine sections, Dr. Clack devotes several pages to a consideration of the essay from a twentieth-century standpoint by reviewing theories of which we have long ago had a surfeit. He speaks of mighty men of straw, when he means soft teeth. As the result of thirty-five years of careful unprejudiced clinical observation, *he believes* that the pulp pays very little attention to caries until it is irritated by the infiltration of acid, notwithstanding the fact that the function of the pulp can be impaired and even destroyed long before caries exposes it! He kindly requests someone to inform him how a fistula develops. He uses the vamps of his shoes, Dr. Rhein of New York, Dr. Weeks of Philadelphia, first cousins, and finally his son in North China, to illustrate and strengthen his review. I fail to find any new truths gleaned from patient research or facts displaying original thought. He does not prove that extension for prevention is of great value, whereas Dr. McCullough does clearly show how fanatical extension may necessitate premature extraction.

THE AUTHOR'S OPINION ON EXTENSION FOR PREVENTION.

In closing, permit me briefly to express my opinion on extension for prevention. Its success, if any, has been derived from the ninety-and-nine teeth that safely lay in the shelter of the fold—teeth that were never in danger; while the one lost sheep has never entered the realm of consideration.

It is the poor weak teeth that are extracted or crowned by the majority of dentists, because they do not have the means of salvation to offer unto them that demand our best efforts. To preserve all teeth, more especially a tooth that is about to be lost, should ever be our desire. To obtain such happy results, *Excavate to preserve!*

Think of the care required in excavating soft white carious portions. Frail cavity walls, rapid approach to the pulp, and nervous, restless patients, are all to be considered. How different such conditions are from the yellow, gray, or dark carious portions found in teeth of medium and good structure with fairly safe pulps, and in patients of highly resistive force! also how different from the very hard, carious areas found in teeth with very resistive pulps, and in patients with high power of resistance! The first-mentioned condition tests the operator's skill to the fullest extent, and can be treated successfully only by the few, while the latter two classes present few difficulties.

How satisfactory when working on frail teeth to excavate to preserve! How unsafe to extend to prevent! The former method insures to the operator the best results possible, while the latter means the death of the tooth.

EXPERIMENTAL ORAL EUTHENICS:

An Attempt Objectively to Measure the Relation Between Community Mouth Hygiene and the Intellectual Efficiency and Educational Progress of Elementary School Children.

By **J. E. WALLACE WALLIN**, Ph.D., School of Education, Univ. Pittsburgh, Pa.,
DIRECTOR OF PYSCHOLOGICAL RESEARCH TO THE ORAL HYGIENE COMMITTEE,
NATIONAL DENTAL ASSOCIATION, 1910–11.

Part I: Introduction.

CIRCUMSTANCES LEADING TO THE ATTEMPT TO MEASURE BY OBJECTIVE PSYCHOLOGICAL TESTS THE EFFECTS OF OPERATIVE AND HYGIENIC ORAL TREATMENT ON THE INTELLECTUAL EFFICIENCY OF SCHOOL CHILDREN.

HERETOFORE practically no attempt has been made to measure scientifically the amount of intellectual arrest, retardation, or deviation produced by sensory defects or by diseases and maladjustments of the bodily organs which tend to lessen the efficiency of the individual.

The belief that there is a close relation between physical defectiveness and mental deficiency has become a generally accepted postulate in current educational, criminological, and medical thought. But the supporting evidence is based for the most part on conjecture or upon insufficient observation. It has been observed that a large percentage of retarded children suffer from a preponderance of physical defects (*e.g.* in Los Angeles, Jefferson City, New York, Cleveland, Philadelphia), and it has therefore been concluded that the relation between physical defectiveness and mental retardation is that of cause and effect.

There have, indeed, been a few attempts made to measure in a rough way the influence of various physical handicaps on school progress.* The time required to finish the eight elementary grades in the New York schools has been ascertained for various groups of physical defectives (using eight years as the standard for the elementary course for the normal child). The percentages of handicap or loss of efficiency were found to be as follows for the defects indicated: Defective vision, 0 per cent.; seriously defective teeth, 5.9 per cent.; defective breathing, 7.2 per cent.; enlarged tonsils, 8.9 per cent.; adenoids, 14.1 per cent.; enlarged glands, 14.9 per cent.; and other defects 8.5 per cent. (Ayres). On the average, therefore, these children required 8.8 per cent. more time to complete the eight elementary grades. In Philadelphia the average loss in efficiency amounted to about 6 per cent.†

An investigation by the Academy of Medicine of the second grade children in the schools of Elmira disclosed the fact that the percentage of defects increased as the number of repeaters and as the number of years the pupils were retarded increased. Thus 21 per cent. of the repeaters had one defect, 30 per cent. had two defects and 38 per cent. had three or more defects. Of those who required three and four years to complete the second year work, 21 and 40 per cent., respectively, had adenoids, as against 19 per cent. for those requiring two years; 17 and 27 per cent. of the third and fourth year repeaters suffered from anemia, as against 15 per cent. of the two-year repeaters. The corresponding figures for defective vision are 24 and 26 per cent. as against 21 per cent. (No data for defective teeth.)

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* Leonard P. Ayres, "The Effect of Physical Defects on School Progress," *Psychological Clinic*, 1909, vol. iii, p. 71. See also his work, "Laggards in Our Schools," 1910, chapter xi.

† Walter S. Cornell, "The Relation of Physical to Mental Defect in School Children," *Psychological Clinic*, 1907, vol. i, p. 231.

These statistical and group methods of measuring results are a marked improvement upon earlier methods, but they suffer from certain obvious shortcomings. With one or two exceptions* they fail to evaluate sufficiently the influence of various contributing factors (secondary to the primary), which make for retardation, such as late entrance, transfer, irregularity of attendance, nationality, etc. Moreover, they furnish no insight into the character of the mental deviation or arrest consequent upon various physical defects, and do not essay to measure the positive benefits which result from orthogenic treatment. It is therefore evident that there are certain fundamental hygienic problems of national significance, affecting the conservation of our racial vigor, which have not yet been adequately investigated by the methods of the modern quantitative sciences.

These considerations prompted me to suggest to the chairman of the Oral Hygiene Committee of the National Dental Association (Dr. W. G. Ebersole), a plan to be carried out in connection with the oral hygiene movement inaugurated in Cleveland last March by the National Dental Association, for the experimental determination of the improvement of various mental traits and capacities, which might be assumed to follow upon prophylactic, hygienic, and operative dental treatment. The value of oral hygiene could thereby be tested experimentally, and the results used to supplement or confirm the observations and reports by pupils, classroom teachers, and medical and dental inspectors. The plan proposed met with approval, and was put into operation on May 31, 1910, at which time the first test sitting was held in the Marion school, Cleveland.

EXPERIMENTAL CONDITIONS TO BE OBSERVED IN MEASURING THE MENTAL IMPROVEMENT RESULTING FROM IMPROVED ORAL CONDITIONS.

First: A series of tests must be devised, specially designed to measure the growing efficiency of a number of particular mental traits during a given period of time. Owing to the influence of familiarity, practice, and memory, it would not be well to use precisely the same material in each of the successive tests of the same sets. By introducing certain changes in the arrangement of the same material, or by using new material of the same difficulty in each of the successive tests, we are in a position partly to combat the factors of familiarity, practice, and remembrance which inevitably make themselves felt in serial tests. We need, then, a set of serial tests, each successive test of which may consist of a rearrangement of the same material [as in our Memory (A), Addition (C), and Perception (E) tests], or of new material [as in our Spontaneous Association (B) and Antonym (D) tests]; but in both cases the material in each of the successive tests of the same series must be uniformly difficult, or as nearly so as it can be made. At the same time the tasks must be of such a difficulty that they cannot be finished within the time limits. The amount of work required should be such that perfect scores are impossible, even after considerable improvement has been made.

Second: Some of the tests in each series must be given before treatment begins, so as to furnish an index of the pupil's initial efficiency; and the remaining tests must be given during the course of the treatment, or after the treatment has been completed, or both.

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* J. H. Heilman, "A Clinical Study of One Thousand Retarded Children in Camden, N. J." *Psychological Clinic* Press, 1910. (This is a gross statistical attempt, based on teachers' reports and the author's inspections and examinations, to determine the relative influence of various factors in the production of pedagogical retardation.)

In the present investigation the first two tests in each series (1 and 2) were given on May 31 and June 6, 1910, before treatment had begun; and the last four (3, 4, 5, and 6), on August 31 and September 21, 1910, and May 4 and 10, 1911, during and after the treatment. (See tables and "graphs" in Part II.) The average of the first two tests represents the pupil's initial or "beginning" efficiency; and the average of the last four, or the last two, his terminal or "present" efficiency. The difference between the two indices represents the gain made between May 1910 and May 1911. There is an objection to considering the average of tests 3, 4, 5, and 6 as the basis for the index of improvement, because the treatment was not finished for many pupils before tests 3 and 4 were given. The objection to taking only tests 5 and 6 is due to the fact that the pupils had become practically a year older between the initial and terminal tests. For the pupil's initial efficiency we might use the results of the second test alone, in order to eliminate somewhat the gain from mere familiarity (it may be assumed that the tests are fully familiar after the second test). This gain is distinctly apparent in some of the tests, in others not (see "graphs" in Part II). In the tables given in Part II the results of each successive test are tabulated in complete form, so that the data may be worked up from any of the preceding points of view.

Third: Standardized, controlled conditions must obtain, and these must be strictly uniform throughout all the tests. These conditions refer to the details of the explanations from test to test, the seating of the pupils, the use of incentives, withholding assistance, the hour of the day used for testing, the time allowed in each test, lack of knowledge on the part of the pupils of the test material, testing the pupils uniformly in groups, not sometimes individually; and using the same supervisory conditions.

A scrupulous attempt was made to conform to these conditions in this research. The first test, May 31, was given by me personally; the second by Miss Cordelia O'Neill, principal of the Marion school, under my personal supervision and from supplied written directions; all the later tests were conducted by Miss O'Neill. Dr. Ebersole was present during all the tests, and timed them independently during the last four sittings. Mrs. Maud Van Gastle, the nurse specially employed to do follow-up work in the homes of the pupils, and the Misses Whelan, Frost, and Miller, teachers in Marion school,* assisted at the sittings in distributing and collecting papers, and in watching the pupils so that no copying could take place. The pupils never saw any of the test papers with which they were supplied until they began to write. They were not allowed to touch the test sheets nor take their pencils until the starting signal was given, at which time they immediately seized the pencil, turned the paper over (always sidewise), and began to write. When the "stop" signal was given they were obliged to turn the paper upside down at once, sign their names on the back, and then place the pencil on the desk. They were urged to do their very best at every sitting, while being cautioned against getting excited or nervous. The children were told that they would be given a reward of $5.00 in gold if they remained with the experimental class till the close of the test year, provided they followed faithfully the hygienic course of treatment prescribed. This consisted of the sanitation of the mouth, brushing the teeth and gums, cleansing the mouth with a mouth-wash after meals, and thorough insalivation of the food. Two demonstration meals were given at the school by Dr. Ebersole, at which the pupils were shown how to chew the food, and also were instructed how to use a tooth-brush properly. Each child was provided with brush and powder.

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* For the untiring assistance rendered by all these generous helpers I am under deep obligations. I also take this opportunity to express thanks to the Board of Education of Cleveland, and the officers connected therewith, for opening the schools for this experimental research. Owing to my removal from Cleveland it was unfortunately impossible for me personally to conduct the last four tests.

The giving of the monetary reward to the pupils was not contingent upon showing an increased efficiency in the tests, but on faithfully following the hygienic course of instruction and regular attendance at the sittings. It should be emphasized that the reward was given seven months after the class had been organized and five months before the end of the experimental year. Consequently, if this factor unconsciously served as a "work incentive," its influence was evidently inoperative during the two final test sittings. Children who failed to follow the prescribed hygienic regimen or to attend regularly (thirteen altogether) were dropped from the class.

Fourth: The factor or condition whose strength is to be determined must be investigated under "controlled conditions."

In the present research this factor is the hygienic condition of the oral cavity, in which is included the repair of diseased teeth, the treatment of the gums, the brushing of the teeth and gums, the cleansing of the mouth, and the thorough mastication of the food. These measures go hand in hand; oral euthenics does not cease with filling dental cavities, polishing the teeth, and mouth sanitation.

Under the conditions of work, this factor was under fairly good control, although it was not possible to put all the mouths in the same condition at the same time. Some required treatment throughout the greater part of the experimental period.

Certain contributing factors could not, of course, be controlled; *e.g.* the fact that the pupils were growing older and thereby changing more or less mentally and physically; the fact that a certain amount of practice and familiarity enters to heighten the efficiency; the fact that the pupils' school work may have been changing, as well as their out-of-school habits, occupations, interests, and diversions; and the fact that seasonal changes occurred during the course of the experimental period. There is only one way of experimentally eliminating influences of this sort, to which we now turn.

Fifth: To place the results upon a strictly comparative basis it is necessary to test two similarly constituted squads of pupils under the same standard conditions, one of these (A) to receive treatment, and the other (B) not. Each squad of children selected should represent as far as possible the same conditions in respect to age, grade, and sex distribution, social conditions, linguistic accomplishments in English, and health and oral conditions. The experimental measurements of two such groups should enable us to determine what amount of improvement is due to familiarity, practice, and natural development, and what to the factor under investigation. The residuum after subtracting B from A would indicate the amount directly ascribable to the treatment.

I had planned the work on this basis, but unfortunately it was not possible during the past year to test a second group of untreated pupils—a work that remains for future research. We therefore are not in a position definitely to determine the influence of the contributing factors.

It seems apparent, however, that the factor of *familiarity* did not influence the results to any appreciable extent after the second test. After the second test the pupil ought to have been thoroughly familiar with what was wanted in each test (with possibly a few exceptions in the antonym test), since none of the tests required any complicated mental action, at least so far as the act of comprehension is concerned.

Whatever the *practice* effects were, it would seem that they could not be very material, because during the course of the year the practice amounted to only 270 seconds in the memory test, 510 seconds in the spontaneous association and antonym tests, 720 seconds in the addition test, and 600 seconds in the perception test. At least, a similar amount of practice during one year is quite negligible in the academic school work. It is probable that the fluctuations in the dispositions, or in the feelings of freshness and enthusiasm, of the pupils from test to test would exert a greater influence than would practice, under the conditions which obtained.

The fact that the pupils had *grown about a year older* during the test period is a circumstance of material moment. But suppose we grant that a small part of the gain was due to practice, and a somewhat larger amount to growth in maturity. This concession, if we can show improvement, would amount to a demonstration that these pupils had been so conditioned during the year that they were able to *learn* (acquire habits from slight practice) and to *make progress.* If the amount of progress was simply equal to the normal rate, that fact would be of prime importance as showing the value of the treatment—because the majority of these pupils had not heretofore made normal progress in their school work, as shown by the school records. The majority, as may be seen from the case histories,* were pedagogically retarded or behind grade from one to five years. This class thus consisted largely of "repeaters" —pupils who had failed of normal promotion. But during the experimental year only one pupil of the twenty-seven failed of promotion, while six completed thirty-eight weeks' work in twenty-four weeks, and one completed two years' work in one year. This indicates that the psychological progress which we shall find was paralleled by a corresponding pedagogical advancement.

It must be emphasized, moreover, that there are certain factors which tend to counteract the gains made through familiarity, practice, and increasing maturity. These arise from the growing monotony of the tests. Performing the same sort of tests again and again naturally bores the pupil, dampens his interest and enthusiasm, produces *ennui.* With the novelty worn off, the pupil would have to resort more or less to forced voluntary attention, and losses rather than gains in efficiency might therefore naturally follow.

Sixth (and finally): The tests or experiments, in order to serve the purpose of a research of this sort, should be so simple that they can be easily comprehended by the pupils in most of the elementary grades after reasonable explanations have been made, and so that they can be given by the teachers themselves if need be. They should be easy of execution and be so arranged that the pupils can be tested in groups. It is often advisable to test pupils in groups, not merely because they work more naturally and more efficiently in groups, as shown by experiments, but often the demands of time on the experimenter make this necessary. Lastly, the tests should embrace a variety of fundamental mental functions (not to mention correlated anthropometric, physiological, sociological, and pedagogical determinations), in order that we may obtain a comprehensive, many-sided clinical picture.

The tests employed in this research were so simple of execution that all that was required was a pencil and prepared test blanks, and a pupil who was able to write a fairly legible hand. The tests were likewise as comprehensive as the conditions permitted.

Taking all the above facts into consideration, as well as the additional data given in the case histories, we feel that we are on perfectly safe ground when we say that a very large share of the pupils' demonstrated gains is directly traceable to their improved physical and mental conditions consequent upon the year's oral hygienic regimen.

NATURE OF THE MENTAL FUNCTIONS TESTED; RÔLE OF THESE FUNCTIONS IN MENTAL LIFE; EXPERIMENTAL VALIDITY OF THE DIFFERENT TESTS.

The five tests given included the following: (1) Test of the strength of immediate visual memory, or the power of recall, by the method of reproduction. (2) Rapidity of thought, as involved in the ability to form spontaneous or free associations with a set of verbal antecedents. (3) Speed and accuracy of forming the controlled numerical associations involved in adding columns of one-place digits. (4) Speed and ability to form such associations as are involved in writing antonyms to a series of supplied simple words. (5) Rapidity and accuracy of visual perception and discrimination, and of manual reaction.

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* Partial case histories, covering the period from May 1910 to January 1911, appear in the published minutes of the Board of Education, Cleveland, Ohio, for February 27, 1911. These have been reprinted, under the title "The Greatest Thing in Oral Hygiene," in the *Dental Digest*, beginning with the January 1911 issue. See also *Dental Summary*, 1911, pp. 125, 301, 463; *Dental Brief*, 1912, p. 141; DENTAL COSMOS, 1911, pp. 333, 787, 1393, 1429. (The articles referred to are by Miss O'Neill, Drs. Clapp, Ebersole, Wallin, *et al.*) See also Wallin, "Experimental Oral Orthogenics," an article soon to appear in print.

These five tests do not explore the whole range of human mental capacity, but they include a few of the mental functions which are basic to intellectual development. We proceed to a consideration of the last test first.

(1) *Speed and accuracy of visual perception and perceptual discrimination.* (See Table V, and graphs V*a*, V*b*, in Part II.) Perception is at the very foundation of mental functioning. From the senses we get the raw materials of the mind. Some indeed are ready to affirm that "There is nothing in the intellect that was not first in the senses"—Without percepts, no concepts; without concepts, no judgments or rational insight. Rational education should thus begin with sensory and physical orthogenesis and training: the correction of sensory-motor anomalies and the strengthening of the physical organs; the former in order to render the senses instrumentally efficient, so that they can perform their normal functions; and the latter in order to bring them to their maximal point of functional efficiency. To increase perceptual efficiency is therefore of paramount importance in individual euthenics. And we may assume that increased physical health and strength, as a result of dental or other treatment, will reflect itself in a heightened perceptual efficiency.

In order to measure the speed and accuracy of perceptual discrimination, recourse has been had to the "A" test. We have used twenty-six lines of capital letters printed on a sheet of paper. The capitals are assorted promiscuously in the lines. The pupil is told to start at the left end of the first printed line and draw a stroke through as many of the A's as possible in the time allowed for the test (100 seconds). He is specially cautioned not to skip any A's or any lines, and not to cross any other letters. Properly to execute this task requires speed and accuracy of perceptual discrimination—more particularly because the letters are close together—and sustained attention. If the pupil does not perceive accurately and attend well he will skip individual A's, or possibly whole lines, and cross wrong letters. (The mere touching or crossing of an adjacent letter is probably due merely to inexactness of motor response and haste.) There is, however, another factor involved in the crossing, namely, the ability to draw a line rapidly and accurately—a controlled motor response (manual reaction). But this factor is probably secondary.

In order to secure a quantitative measure of positive efficiency in this test we count up the number of A's crossed, and score each as 0.5 per cent. To secure a combined measure of quantitative and qualitative efficiency we deduct 0.5 per cent. (one-half per cent.) for each A missed and for each other (wrong) letter crossed.

The A test gives us a valid measuring-rod of improvement of visual discrimination under standard conditions, provided the successive test sheets are uniformly difficult. They may be made such by distributing the A's differently in each line, while yet retaining approximately the same number of A's in each group of four or five lines. The following tabulation of the number of A's in the first five, ten, fifteen, and twenty lines shows that the different sheets were made practically equi-difficult:

Number of A's—	No. of test.							
	(1)	(2)	(3)	(4)	(5)	(6)	(1),(2)	(3)–(6)
In first 5 lines	39	37	38	37	36	40	38	37.7
" " 10 "	78	77	74	77	78	81	77.5	77.5
" " 15 "	116	113	116	115	116	115	114.5	115.5
" " 20 "	155	152	151	153	154	154	153.5	153.0

The average for the initial tests are almost exactly the same as for the treatment tests. In only one case does the difference exceed four.

(2) *Immediate visual memory span.* (See Table I and graphs I*a,* I*b.*) A second fundamental function is memory, for without retentiveness there could be no experience, and accordingly no progress. When we say that we learn by experience we mean that we are able to make anticipatory provision for the future by reinvisaging the past. We can live over the past in a present memory experience, and also project the past into the future through a constructive image of the imagination. Bereft of this power of rational foresight, which is based on the memory image, the tropical traveler would not be able to anticipate, and thus be unable to prepare for, the conditions to be met with in the torrid zone; the polar explorer would be equally helpless in preparing for the boreal blasts; the pupil could not anticipate the morrow's lesson or examination, etc. On the basis of past experiences we all anticipate and thus provide for future needs, on the assumption that the future will duplicate the past. But we should know nothing about the past unless the brain possessed the power of retaining and reproducing impressions. Consequently the greater this power, the more perfect the individual's possible adjustment to his present and future environment. Since, therefore, Without memory, no experience; without experience, no learning; and without learning, no progress—any regimen which will enhance the brain's power of retentiveness will play an important rôle in racial euthenics.

It is desirable to test improvement in memory efficiency, because of the alleged fact that there is no mental function so intimately dependent on the individual's physical condition as memory. It is proverbial that when we are exhausted through overwork, insomnia,. disease, worry, etc., the brain-cells are not impressionable, and hence respond very sluggishly. A certain dictum has gained wide acceptance—namely, that memory power is not improvable by training or practice; it is a fixed native capacity; its limits are strictly set by heredity and bodily condition (a fresh, well-nourished brain, oxygenated blood, etc.). While this dictum is probably extreme, it is reasonable to assert that any noticeable improvement in memory which the individual makes within a year's time can be ascribed to an improvement in physical and mental condition. By measuring the memory span we can thus secure a valuable index of increased mental efficiency as dependent upon the factor or factors under investigation.

To measure memory span we may use either non-sense materials (meaningless syllables or numerals) or meaningful facts. In the present research ten three-place digits were presented visually to the pupils, who memorized as many as possible during a study period of 45 seconds; and then during a period of 60 seconds wrote what they could remember. A credit of 10 per cent. was scored when all three digits of a number were correct; 6.6 per cent. when only two digits, and 3.3 per cent. when only one digit were correctly reproduced. (In future work 6.0 + 3.3 per cent. should be scored as 10 per cent.) The results thus furnish an index of immediate memory span for digits. It should be emphasized that this test is dependent upon actual *memorizing.* Most tests of this sort are made with momentary or very brief exposures, in which case the reproductive capacity is dependent essentially upon the primary impressionability and retentiveness of the neurones.

With the materials used it was comparatively easy to arrange the numbers systematically so that no combinations would recur and so that each test was of equal difficulty.

(3) *Spontaneous association, with supplied key-words.* (See Table II; graphs II*a,* II*b.*) Success in life depends on one's rate of thought—the speed with which one can form and associate ideas (aside, of course, from the quality of the associations). The rate of the stream of thought, aside from hereditary and temperamental factors, will vary with physiological conditions—depression, ex-

hilaration, euphoria, exhaustion, disease, malnutrition, etc. Any conditions which interfere with proper nerve action, oxygenation of the blood, and nutrition, such as wrong habits or naso-pharyngeal and dental disorders, may be expected to produce a retardation in the stream of thought, particularly during the period of immaturity.

Thinking consists fundamentally in forming connections between ideas, in forming *associations.* We may therefore utilize an association experiment with which to measure the rate of thought, such as the *free, running* association experiment, in which the subject, after being supplied with one initial key-word, continues to write a list of single words; or we may use the spontaneous association experiment with predetermined antecedents. In the latter, which has been used in this research, the pupil is supplied with a sheet of paper containing 30 simple, everyday words arranged in a column. He is told to write opposite each word, as rapidly as possible, the first word which it suggests. It is immaterial whether or not it is logically connected with the antecedent, just so that it is the first idea aroused (the words written, however, usually form a logical connection). He must write only single words, not phrases. If he finds a word which fails to arouse any idea he may pass over this and proceed to the next, returning later to the refractory word, if time permits. The time allowed for writing was 85 seconds (in future work it is advisable to shorten this to 60 seconds), and the number of words written during this period represents the speed of forming the associations plus the time required to write the words. If we assume that the writing time is approximately constant from test to test—an assumption which is justified evidently unless the pupils happen to write unusually long words in some of the tests—the percentage of increase in the number of words written from test to test will supply the index of improvement in forming associations. The successive word-lists are made up of simple words of the same general character, and are therefore as nearly equal in difficulty as it is possible to make them (at least for the Cleveland children—a few local terms were used). The associational fertility of words of the same familiarity will differ, of course, with different children, a condition that cannot be remedied. (It is well to add that in those cases where only a few words were written, the writing time is entirely negligible. Where a considerable number of words were written, the number would depend not only on the ability to ideate rapidly, but to write rapidly. But it is impossible in this experiment to measure independently these two times—the thinking and the writing time.)

(4) *The speed and accuracy of adding—forming controlled numerical associations.* (See Table III and graphs III*a*, III*b*.) An indispensable element of social control is the ability to skilfully perform the four fundamental mathematical operations. No individual is properly adjusted to his social environment who lacks command of this social instrument. Adding may be regarded as the most basal of the four fundamental processes, and may thus form the basis of educational research. Now, the pupil's ability to add will vary with his age, training, hereditary mathematical proclivities and talents, and conditions of physical and mental health. Any improvement shown during the course of a year may be assumed to be due primarily to training or improved physical and mental condition.

In this test the pupils were asked to add as many columns of figures, each column containing ten one-place digits, as possible within the time limits (120 seconds). No columns were to be gone over for corrections. They must work with maximal rapidity, but try, at the same time, to get the sums correct. Four per cent. was credited for a column correctly added, and 2 per cent. for a column incorrectly added. The score thus furnishes a combined speed and accuracy index. Columns added up incorrectly obviously consumed as much time as those correctly added, and should therefore, it would seem, receive some credit on the basis of the speed factor. Such scoring admits of possible injustice, of course, in the case of those pupils who really do not sum up the columns but simply write some figure at the bottom. Such cases should receive no credit. On a strict accuracy index, incorrect answers, it is needless so say, cannot receive any credit. Our index, as stated, is a combined speed and accuracy index.

The digits were arranged indiscriminately, so that the successive tests should be equi-difficult. Any improvement would therefore be due to heightened ability to add—greater speed, or accuracy, or both. What percentage of the improvement may be ascribed to training cannot be definitely said. The training from the tests themselves could probably not be very large, so that the training effects would largely accrue from the adding work in the regular recitations. The amount of progress which a pupil would normally make in the course of a year from classroom work in adding has never been determined. But if we assume that a part of the improvement shown in this test represents training effects, the fact is vitally important as indicating that the pupils had been so conditioned that they could profit from training in one of the very fundamental activities of the school.

(5) *The speed and accuracy of supplying antonyms to given antecedents.* (See Table IV and graphs IV*a*, IV*b*.) One of the best controlled association tests consists in writing, opposite to each word of a list of supplied words, a word having the opposite meaning (an antonym). Thus: Better—*worse*. Sunrise—*sunset*. This requires a high degree of associational efficiency and intelligent discrimination—an accurate knowledge of the meanings of given words and of the words expressing the opposite meanings. To an efficiency of this sort, age, training, and capacity for development contribute. During the course of one year experience and growing maturity naturally make for increased efficiency. What the normal rate of improvement is, with or without training, we do not know. In the absence of such norms the progress shown in our tests will be highly significant because it indicates improvement with a minimum amount of training—probably not appreciably more than the training received in the tests themselves. Such improvement would not occur, it may be assumed, unless the individual improved physically and mentally. Merely growing older would only give rise to such slight improvement as would result from haphazard experience, but those physical conditions which further or retard mental development should play a more important rôle. We therefore seem justified in regarding a large share of the progress shown in this test as due to improved physical and mental condition, provided the six successive tests were of equal difficulty. The six lists drawn up by me were submitted to two persons, who passed upon their relative difficulty. The lists adopted represent the consensus of opinion.

It should be noted that it is a considerable difficulty to construct six lists, each with 25 words, of uniform difficulty. First, it is difficult to find 150 simple words with familiar antonyms. Second, several words fit as antonyms to some words, but only one to others. Third, some words allow one or several partially correct opposites, while others permit only one definite antonym. Fourth, although the words chosen appear to be approximately equal in difficulty, the antonym equivalents are less frequently associated in the case of some than in the case of others; and this may differ widely with different children. The attempt has been made in the lists used to lessen these difficulties by distributing the easy and difficult combinations, by allowing one-half credit (2 per cent.) for partly correct antonyms, and by permitting the pupils to pass over difficult words, with the instruction to return to them if the time permitted. These measures should render the lists valid developmental measures, but necessary rearrangements can be made should experience with normal children indicate such a need.

In Part II will be summarized briefly the general results of the psychological tests. For the *case histories,* which detail the condition of each child at the time of entering the class, and his subsequent progress in health, deportment, disposition, attendance, scholarship and intelligence, consult the references given in the footnote on page 408.

(To be continued.)

IS OPERATIVE DENTISTRY DEGENERATING?

By **JAMES TRUMAN, D.D.S., LL.D., Philadelphia, Pa.**

THE progress of dentistry seems to be largely influenced geographically in these latter days. If we are to judge by the evidence presented, the center of dental wisdom lies not in the older civilizations, but finds its more active home in regions once given over to the buffalo and wild horses of a past century. This is stated simply as an observed fact and constitutes no criticism of modern civilization. It is in the nature of human advancement that new regions should develop original ideas, and this has been markedly manifested in the settlement of this country. Its originality has been a shock to the older civilizations, and the inventive genius exhibited in all departments of activity has not increased the love of the descendants of the Romans, Goths, and Franks, for the similar descendants who, transported and propagated in virgin soils and freedom from the restraints of the doctrinaires of the preceding centuries, have developed into a mental enthusiasm not in accord with the ideas of a past age.

It is, therefore, strictly in accord with the progress of thought and its activity that the West, so called, of this country should have created a dental atmosphere not quite in harmony with the older sections. These latter view with some suspicion the said atmosphere, as not being entirely cloudless; indeed, many regard it as being inimical to a healthy development of dentistry and in a large degree subversive of sound progress. It assumes to occupy the position of a dictator to the dental world. There would be no objection to this standard if it were based always on sound principles and perfected practice. This is, however, not the rule, and seemingly has for its guide not the work of the fathers but the guesses of the children. The writer has been led to this thought by some of the recent articles in our periodicals, papers, and clinics at conventions, and the query has arisen in his mind, Is all this so-called progress to advance the dental profession, or is it simply a wholesale experiment at the serious cost of the patient and the eventual destruction of all that has been gained in the past? It seems as though the present hour is one for self-examination and for each one to demand of himself the question, and extend it to others, Whither are we drifting?

"EXTENSION FOR PREVENTION" AS A CATCH PHRASE.

The writer has been much interested in an article by Dr. W. R. Clack of Iowa, published in the DENTAL COSMOS for January, ostensibly as a review of a paper by Dr. P. B. McCullough of Philadelphia on "extension for prevention." There has been a great need for professional enlightenment on the question, although it has been supposed to be settled for all time in the middle West, or as Dr. Clack puts it: "It has passed the point of discussion and is accepted by the progressive dentist just as finally as asepsis is accepted by the progressive surgeon." The doctor could hardly have made this stronger, but unfortunately it cannot apply to some who claim to be progressive and to exercise an intelligence not inferior to the inhabitants of more favored regions. No question can be regarded as settled until it is founded on absolute truth, and this cannot be said of that in contention. It is true there has not been much written about it, for the excellent reason that those who had adopted this catch phrase as embodying a truth were satisfied, and their opponents regarded it as too trivial to be worth printer's ink to combat. The writer regards both sides of this controversy—if controversy it can be called—as in serious error, the one for self-assertion and the other for neglect.

The writer may be equally in error in magnifying its importance; if so, he may feel he is in good company, at least, in that of his good friends Dr. McCullough and Dr. E. C. Kirk, who read a paper before the American Dental Society of Europe at its annual meeting, held in Paris, March 25, 1910.* This paper covered this question of extension for prevention, and his views in part are given in the following quotation:

> Immunity and susceptibility to dental caries are functions of the environment of the teeth and consequently of nutrition. Areas of tooth structure as such have nothing whatever to do with determining either immunity or susceptibility, for areas *per se* are concerned only with localization of the decay process. Extension for prevention applies only in cases where the carious process is at present active. It is not justified in cases where caries has been active and is not at present active, nor is it justified as an operative principle on the assumption that decay may be active at some future time. It is failure to recognize these limitations of the principle involved in the extension-for-prevention axiom that in the judgment of conservative men is resulting in a wholesale mutilation of tooth structure that is scarcely less in magnitude and importance than that wrought in the earlier days by the separating file;—a mutilation in both cases due to the universal application of broad generalizations in each instance based on insufficient data.

It is not the writer's purpose, however, to answer Dr. Clack or to defend Dr. McCullough's paper. His aim principally is to give his own views on this much neglected subject, and on others equally shelved as professionally finished.

"IMMUNE AREA" AS A CATCH PHRASE.

Dr. Clack quotes Dr. Black as defining the phrase, and he (Dr. Black) says: "Extend until the cavity margins are in immune area, then stop." This is not new, but some of us have been waiting a long while, so long that it became almost a hopeless outlook, for a true definition of this celebrated sentence. Dr. Clack seems more concerned to crush Dr. McCullough than he does to state definitely what is meant by immune area, and the reader is left still in the dark concerning this important matter. The result has been that this catch phrase has been variously interpreted, and those who have adopted it in the preparation of cavities have used their own judgment, not always in the best light of pathological knowledge. Dr. Clack does not hesitate to state what he regards as a correct definition, for he says: "*Extension for prevention has nothing to do with depth of cutting, but only with surface-extension, which involves slightly more than the depth of enamel thickness.*" (Italics the writer's.)

AN ILLUSTRATIVE PINHEAD CAVITY PREPARATION.

With this explanation we are prepared to start an illustrative cavity. The reader may suppose he has a cavity on the approximal surface of a lower molar, not larger than a pinhead. Now, in preparing this cavity the operator must bear in mind one thing—he is to reach immune surfaces, and he must not go below the thin shell of enamel. He starts first to prepare the main cavity, and having settled this he carries his drill through sound and healthy tissue until he reaches the supposed immune area on the buccal and lingual surfaces. He cannot know with any precision where said

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*See *Dental Review*, 1910, vol. xxiv, p. 1112.

area is to be found, but supposes it may be on the convex surfaces of the tooth named, or where the tongue and brush can have free access. Having completed the search for so-called immunity on the surfaces named, the labor of discovery must be extended to the gingival border, for according to authority immunity can alone be found under the gum, and to insure this the cavity must be carried below that tissue.

Why this gingival cover should render a cavity immune is not explained. It is true it has been supposed to be answered repeatedly, and is again stated by Dr. Clack, who reinforces his opinion by the quoted assertion of Dr. Black that these micro-organisms—those that produce acid—do not live under the free margin of the gums. It would be of great interest to know whether this was ever determined by a multitude of cultures. It is difficult to believe that Dr. Black would have made such a statement without multiplied evidences to support it. The writer's experience in bacteriology, while covering much labor, is not sufficient to antagonize this statement, but such experience as he has had does not warrant the belief that any part of the human mouth is free from micro-organic life, and especially is this true at the free margin of the gingivæ. The lines of decay at the cervical borders of teeth give mute evidence that the acid action there is a constant danger to humanity and an annoyance to the operator. It would be well for those who hastily jump at conclusions upon insufficient evidence to heed the advice of a master in mouth bacteriology—Dr. Theo. von Beust of Dresden. His very valuable paper on "The Study of the Micro-organisms of the Human Mouth" was recently read before the American Dental Society of Europe, and published in the February number of the *Dental Review* of Chicago. He writes:

> Returning to emphasize the fact that a large number of the forms found in the mouth cannot be grown artificially, it will become apparent to close observers that scientists have proceeded illogically in accepting certain deductions derived from the results of culture experiments. For instance, if experiments aiming to effect the isolation of the specific organism of pyorrhea by culture, should show in 100 per cent. of inoculated plates a given organism, would it be justifiable to accept this organism as being etiologically connected with this disease? If inoculations from 100 root-canals which have been treated by the best methods known to dental science be made and no growth secured, could these canals be pronounced sterile? And furthermore, if a certain organism be isolated from the depths of a carious cavity in each of a hundred experiments, could this be declared to be the specific organism of decay? Why, to answer these questions affirmatively would be equivalent to neglecting consideration of the uncultivatable organisms, which the student of the morphology of the forms found in tooth slime must recognize as being a thousandfold in point of numbers in excess of all cultivatable forms commonly contributing to the formation of this deposit. These observations are by no means intended to create the impression that culture experiments are of little value. They shall, however, convey the idea that culture experiments are of questionable value just so long as the uncultivatable forms are given no attention, as has usually been the case.

PROCEEDING BELOW THE GINGIVAL BORDER.

To proceed with the illustration, the pinhead cavity is then carried down below the gingival border. To accomplish this, the said cavity must be extended to the dentin of the root, cutting away the cementum and the pericementum and dangerously encroaching on the pulp, and, in any event, subjecting that organ to thermal shocks that in due course of time will arouse inflammation there and ultimate devitalization, with pathological sequelæ not pleasant to contemplate.

The preparation of the pinhead cavity is not, however, complete; the so-called immune surfaces have been reached and provided for, but the cavity over that surface, of from one to two millimeters in depth, is not well fitted to receive a permanent filling. Dr. Clack, however, says that extension for prevention does not mean deep cutting; but exactly how a permanent filling can be made in such a shallow cavity is not settled and does not appeal to the writer as a satisfactory proposition. His experience as a teacher of many years in operative dentistry, and as a clinician before bodies of men, leads him to conclude that it would be a dangerous experiment. It does not seem, either, to comport with the essayist's own views, for he devotes a good deal of space to deep cutting and formation of a seat, which it is impossible to produce without extension into the dentin. The pinhead cavity is not yet complete, for the occlusal surface, with its fissures in the enamel, is an ever-present menace and must be removed. This involves deep cutting, and although this has nothing to do with extension for prevention, according to our essayist, eventual success cannot be hoped for while this dangerous surface remains undisturbed, so this must be cut away. Now the cavity is practically completed, minor details omitted.

COMPLETED RESULT OF ILLUSTRATIVE CAVITY PREPARATION.

When this procedure is summarized, the result is that from a pinhead cavity one has been formed covering the larger portion of the approximal surface and denuding the tooth of its enamel mail, cutting away the strong and powerful occlusal resisting surface, impinging upon and destroying part of the dentin of the root, thus sacrificing one-third of a good molar to reach immune surfaces—and, in the end, it is a failure. The fact that fillings thus made resist caries for years is not sufficient evidence, for this was accomplished with old modes of practice. It is true that under twentieth-century methods the line of division between gold and dental tissue is placed where brush and tongue can reach it readily, but the microscopic line remains a permanent danger. All old operators feared this, and aimed to make the gold filling as near perfect at this portion as possible, always conscious, however, that this was the weak portion of their work. It can never be in immune regions, and if saved eventually from caries, it is due to careful work rather than position.

The filling and finishing of said filling is simply an effort of time and patience, but in what condition is the pericementum left under the gingival border? No attention is paid to it, but nature has established one rule which is not to be violated with impunity, and that is, that any violent disturbance of these nutrient tissues will end in inflammation and their final destruction. The man who laboriously fitted crowns and root bands did not credit this, but the dental world is beginning to find that crowns impinging on the pericementum mean probable death to that tissue. The pathologist of the past knew this, and sounded an unheeded warning. The same applies in minor degree to this filling below the gum surface—not so much to the filling as to the injury produced in finishing.

THE ABOVE CAVITY PREPARATION AN ACTUAL CASE.

Some may be of the opinion that this pinhead example is the result of prejudiced imagination, but the truth is that it is not based on imagination at all, but is a description of a case in practice observed by the writer and carried out in minutest detail by an operator. If our friends of the extension-for-prevention school object to it, they are bound to prove that their loose teaching, through a catch phrase, does not lead directly to such fearful destruction of tooth tissue. Aside from this simple case the writer has observed an increasing tendency in our schools to adopt this method in modified form, and it is time the principles, theoretical and pathological, should be fully and without prejudice considered.

IN THE "CHINESE" CLASS.

Others will object to this manner of treating an important subject as simply hypercriticism. The writer is, however, of the opinion that the proper way to elucidate a subject is by example, and hence the treatment of a pinhead cavity is a worthy subject to illustrate extension for prevention, as described by its defenders, and as he understands it through observation, reading, and the paper of our esteemed friend resident in Iowa. The writer will without doubt be classed by him, as he has classed all who critically object to extension for prevention, as a reminder of the Chinese, who refuse to make any change in their methods as these have existed since the period when the Romans invaded Britain. We thank our friend from Iowa for placing all of us who do not believe that the salvation of operative dentistry rests on extension for prevention with the children of old Cathay. When Britain was a province of Rome, when Germany was crossing swords with that nation and adopting its advanced military tactics, when America was undiscovered, China had been rearing the *Bombyx mori,* the silkworm, and for three thousand years had been weaving the product into garments for kings. China was using type in printing nine hundred years before Guttenberg dreamed of printer's ink, and was manufacturing paper in or before the sixth century. It discovered a drink that would stimulate without producing inebriety—tea—and last but not least, it is now a republic, founded after the youngest of nations—and that nation, violating its known principles, refuses to have these oldest civilizers enter its domains. We thank our friend for placing us among such an advanced people, and hope we may profit by the oldest civilization of the world.

IS OPERATIVE DENTISTRY DEGENERATING?

At this writing the program of the Chicago Dental Society lies before the present scribe. Out of ninety-six clinics only three are devoted to gold filling, and one of these is from the East, while eleven are devoted to gold inlays. It is not many years in the past when a similar examination of a program from that locality would have shown bodies of operators exhibiting their skill in condensing gold in cavities. Are all these skilled men laid on the shelf and the gold inlay substituted for the laborious effort of a century of development in perfecting gold filling? Shades of Townsend, Arthur, Varney, and Webb, forbid this desecration!

There is one trait very objectionable in the American mental make-up, and that is an insatiable desire for something new and easy. This has its advantage in perfecting machinery to accomplish the work of many men; and the dentist has not been behind in this demand for more remuneration and less labor, with the result that the gold inlay, in some sections, has supplanted the filling of the fathers, and we are informed that gold fillings and the labor connected therewith are all done away with, and the beautiful gold fillings are no more, for these can now be produced in the laboratory. Of course the man who does not follow established usages settles this to his satisfaction, but the man who stops to think begins to ask questions.

He recognizes the fact that a cast of a cavity can be made, but he is also aware that castings are not absolute perfection; they are apt to draw away from the mold and when placed in a cavity have quite wide margins—wide microscopically—that must be dealt with; and further, the gold casting has no retentive power. This is conceded and the cement is brought in to assist in holding it in place. There is no place of immunity for this cement, for wherever it may be exposed to the secretions of the oral cavity there begins disintegration, and following disintegration comes caries and dislodgment. Theoretically, therefore, no inlay, no matter of what it is composed, can be permanent, and yet the dentists of the middle West seem to have considered its use as an indication of progress. Inlays, whether of gold or porcelain, should be used for special conditions, and then only as substitutes for more permanent work. Those who favor gold inlays will not be inclined to love the writer, when he says that in his opinion it is the lazy man's makeshift that will bring eventual discredit on our profession, and, if continued as a recognized operative procedure and as taking the place of the gold filling, will end in the destruction of a vast number of natural teeth and also eventually destroy the skill secured in filling by a century of work. If this knowledge and skill is retained, it will be through the skepticism of the dental college faculties, who may refuse to abandon the old methods, and continue the work of the fathers and endeavor to improve it through technical skill.

DANGER OF CATCH PHRASES IN PROFESSIONAL WORK.

The writer objects to being classified as one of the obstructors of dental progress for the reason that he is opposed to basing professional work on a catch phrase. The classification of all who object to the dictum "extension for prevention" as being antagonistic to dental progress is manifestly unjust as well as discourteous to a large body of thinking men. The man who utters or holds the thought should reconsider and dilute his radicalism with a mild conservatism, an essential to all true progress. The true progress in a profession such as dentistry, as the writer views it, lies in a combination of the theoretical with the practical, and without this combination all advances will end in disappointment. The history of dentistry is replete with losses and gains—losses through lack of this combination, and gains because the skill of the artizan was combined with the knowledge of the pathologist, and these must be harmoniously blended if dentistry is to develop in the future into the fair proportions of a profession.

We need all that is new and should welcome every advance. Our professional anchor, however, should occasionally be dropped upon the shores we propose to leave behind, before we attempt to sail on unknown seas of new discovery. When our bearings have been truly found, then, and then only, may we be able to feel that we are drifting into safe seas and safe harbors, and reap the reward of an advanced civilization that despises nothing worthy in past history, but ever looks forward to the activities that will inure to the benefit of our common humanity. Thus we may exalt our several callings, and the profession of our choice will advance, through constant evolution, to a broader conception of related facts and the application of these to the ever-increasing needs of a progressive world.

DENTAL ICONOCLASM.

By G. S. JUNKERMAN, A.M., M.D., D.D.S.,
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THOSE who worship heroes rarely advance beyond the standard set up by the heroes worshiped. In a professional sense, methods accepted as perfect are stumbling-blocks to further progress. Those who in their teaching and writings are habitually given to quoting and relying upon authorities, soon arrive at the "dead-point"—a position which is fatal to the mind bent on investigation. Perfect rest and satisfaction have no place in a live mind bent on improving what really exists. Heroic acts and established methods should be used only as stepping-stones to further progress, which in turn becomes only a stepping-stone to higher advancement. Resting at any stage of progression involves a risk of slipping backward when the rest is too long and the weight becomes too heavy. True iconoclasts are those who "bowl over" standards, but set up better standards on a higher lever of progress. Those who unquestioningly accept the reins of authority and trudge on, never looking to the right or left, will always be dragging an ever-increasing dead weight behind them. The truly progressive man is never a hero-worshiper, although he gives liberal credit to those who have earned it. The world is full of men who blindly follow the methods of others, these methods only too often being but partially and imperfectly developed.

SELECTION OF FILLING MATERIALS.

To no other field of endeavor do these facts apply more practically than to the use of filling materials in dentistry. Filling materials fail in effectiveness for two reasons: These are (1) defective qualities inherent in the material itself, which render it hopelessly obsolete, and (2) defective methods of using it, which are often the result of a knowledge of only part of the valuable qualities possessed by such a material. In the one case the material should be condemned and discarded, in the other case the operator should be subjected to the same discard and condemnation. From his extended experience the writer believes that there are no two substances that will give a more vivid illustration of the above conditions than the silicate cements in the first case, and gold in the second case. The silicate cements have not only demonstrated inherent defective qualities, thus obliterating any claims to their permanence as a filling material, but by comparison they have more firmly established gold as the only known material which has no inherent defects.

GOLD AS A FILLING MATERIAL.

The only defect in gold, besides its color, is the deficiency in the methods of its use, this deficiency arising from the monumental ignorance of a great majority of operators who either cannot or will not recognize all the physical qualities of this material, which, if skilfully and judiciously used, would be universally acknowledged to be the only perfect filling material known. Anyone who is not thoroughly conversant with all the physical qualities of drugs and chemicals would be a poor one to be let loose in a hospital to apply these substances to a suffering public. "Ignoramus" would be hardly a sufficiently strong epithet to designate his personality; yet dentists are daily using gold, never realizing that they are jeoparding their usefulness by their ignorance of the physical qualities of the material which they are rather abusing than using.

COHESIVENESS AND PLASTICITY OF GOLD.

The two most useful properties of gold are its cohesiveness and its plasticity. Gold with a maximum of cohesiveness, while plastic, is not plastic in the sense of its application as a filling material. *Plastic* gold has a minimum of cohesiveness, which increases by manipulation, while *cohesive* gold becomes plastic by manipulation. Gold reaches its maximum of cohesiveness when it is raised to the temperature of its melting-point and is then allowed to cool to a normal temperature; it possesses its minimum cohesiveness as a dental filling material when by the gold-beating process it has been changed from its maximum cohesiveness into what is known as No. 1 foil. It is plain to be seen from this fact that manipulation changes gold from cohesiveness to non-cohesiveness. An example of this is offered by the over-malleted cohesive-gold filling, the surface of which suddenly becomes non-cohesive when too much malleting has been applied. It does not seem to be universally known to practitioners that the surface of a non-cohesive gold filling can be rendered cohesive by the process of malleting. From these facts it is plain that manipulation is the great factor that causes the physical properties of gold to bend to the skill of the manipulator. While it is of no particular advantage to render cohesive gold non-cohesive, extreme importance and usefulness attach to the fact that non-cohesive gold may be rendered cohesive by manipulation. That gold in a plastic state can be perfectly adapted to walls and surfaces and be rendered cohesive at the same time is a fact that too few operators have realized. Our forefathers used gold for large fillings that lasted indefinitely, yet they never knew what cohesiveness was; their knowledge only went so far as plasticity, and yet their fillings were rendered cohesive *unconsciously* by skilful manipulation. Cohesiveness is an important quality of gold, but any filling material that has not a great degree of plasticity is worthless. Many operators flatter themselves that they are making use of the plasticity of gold by filling one-half or two-thirds of a cavity with soft gold and topping it off with cohesive gold; while in reality the integrity of any filling depends on the thoroughness with which the orifice is filled. An empty bottle may lie in water indefinitely and remain perfectly dry inside, if it is stoppered with a good cork. It would be much better practice to fill one-half or two-thirds of a cavity with cohesive gold, and employ plastic gold for the uppermost layers and orifice. Since such is the case, why should we not go to the trouble of attaining sufficient skill to fill the entire cavity with plastic gold? Ninety per cent. of all cavities can be filled in this way with a saving of much time for the operator and of infinite torture for the patient. The profession has recognized time and torture as elements to be reckoned with, else gold inlays would never have been used; yet the latter are not as good nor can they be made as speedily as plastic gold fillings. No human eye is sharp enough to follow a cavity outline, nor is any hand skilful enough to make a cavity border without invisible *indentations.* The use of cohesive gold, however, demands such precise cavity preparation, while non-cohesive gold makes no such exacting demands. If a plastic gold filling is examined after the shell has been cracked off, it will be noted that, if the gold has been manipulated sufficiently cohesion has been induced; not, however, as much cohesion as if cohesive gold had been used, but sufficient for all needs of utility as a filling.

In the minds of many operators a fallacy exists in regard to cohesive and non-cohesive gold. The real difference between the two forms is purely physical. Non-cohesive gold is produced by manipulating cohesive gold in such a way that the molecules are separated, and the power of cohesion is decreased, according to the laws of cohesion, which depends upon the propinquity of the molecules. Cohesive gold is non-cohesive gold manipulated in such a way that the molecules are brought more closely together, so that the power of cohesion may act with more vigor. Thus manipulation plays a rôle with cohesive gold as well as with non-cohesive gold, although in a directly opposite manner. The gold-beater's process renders gold non-cohesive; heat applied in the annealing process renders gold cohesive. The operator of non-cohesive gold purposely manipulates his material so as to bring it into a cohesive state; if, however, he over-manipulates cohesive gold he unintentionally transfers it into the non-cohesive state. The reason why only the surface of a cohesive foil filling becomes non-cohesive is that sufficient manipulation is restricted to that surface. If the same force could be used throughout the filling, the entire filling would become non-cohesive. On the other hand, if sufficient force is employed in manipulating a non-cohesive filling, the entire filling becomes cohesive. Any two parallel walls—this condition being presented in about 90 per cent. of cavities—offer an admirable opportunity for packing, condensing, and manipulating non-cohesive gold to a state of cohesiveness sufficient for all practical purposes. The cutting edges of incisors present the only case in which non-cohesive gold is contra-indicated, yet I have known operators who were skilful enough to accomplish even such a feat.

We can no longer differentiate between cohesive and non-cohesive gold by judging from surface conditions. The difference lies more deeply, being based upon molecular relationship. The evaporation of gaseous fumes from the surface of gold foil is only incidental to rendering it cohesive. Heat produces the molecular conditions necessary for cohesiveness, and evaporation of the foreign substances of the film purifies the gold, a condition which must of necessity exist in all gold used for filling purposes—meaning only pure gold. Gold that contains foreign substances cannot be employed for filling purposes consistently with good practice. Quite a few forms of gold have been presented for use, but all gold possesses practically the same physical qualities, and these cannot be changed except by the introduction of some foreign bodies which render the gold useless for our purposes. Crystallization may enter into the molecular relationship of gold as it does in water when it changes to ice. This consideration probably has given rise to the manufacture of various so-called crystalline golds, but these materials do not concern us here. At one time a gold foil was made, the manufacture of which has now ceased, known as Abbey's foil, which was generally believed to be absolutely non-cohesive. Yet, there can be no absolutely non-cohesive pure gold, and I have encountered no difficulty whatever in inducing cohesion in Abbey's gold foil by operative manipulation.

MANIPULATION OF GOLD.

The manipulation of non-cohesive gold is usually said to require special instruments, different from those used for cohesive gold. This contention I consider an absolute fallacy and detrimental to success. The very same instruments should be used for cohesive as for non-cohesive gold. Special instruments may be employed and a partially successful result be obtained, but for complete success such instruments should be discarded from the beginning; otherwise the fillings will be full of *coops,* and lack cohesion throughout.

The principles set forth herein do not rest on theory, and have been proved many times. Gold is a very obstinate, refractory, and seemingly contrary material, which will become perfectly docile only under skilful manipulation. A skilled operator, however, can do anything with it, and make it go and stay where he wishes. Patience and experience are the requisites for a successful mastery of this material, which amply repays all efforts. For a time it seemed as if the discovery of the silicate cements would displace gold to a large extent from the head of the list of filling materials. It is to be regretted, but is nevertheless a fact, that gold has "come back," and has established its position as the most valuable filling material more firmly than ever in the minds of those who have learned and mastered all its properties, while the silicate cements have proved themselves wofully deficient in every requirement that we have a right to expect them to fulfil. This paper is not intended to discourage, but rather to stimulate renewed vigor in the use of a material which in the writer's opinion the majority of dentists have not rendered sufficiently subservient to their needs. The day may come when some plastic will be discovered that will be better than gold, but it has not arrived yet. It is useless to shut our eyes to the painful truth and hide behind ignorance, when a little energy will place at our disposal a material so valuable as gold in regard to *all* its properties.

PROSTHETIC DENTISTRY OF TODAY, AND ITS POSSIBILITIES.

By NORMAN S. ESSIG, D.D.S., Philadelphia, Pa.

(Read before the Northeast Philadelphia Association of Dental Surgeons, October meeting, 1911.)

NOW that professions have been broken up into different departments and have resolved themselves into specialties, prosthetic dentistry seems to have been permitted to care for itself, and in many instances is only used as the pot-boiler of dentistry.

This means that the dentist will do mechanical work until he has acquired sufficient office practice to enable him to drop prosthetics altogether and give his undivided attention to operative dentistry, which he deems more dignified and more profitable.

This method is followed by a large proportion of our graduates, and can have but one result as far as prosthetic dentistry is concerned—a very depressing effect and an influence not likely to be conducive to better results in this field, since serious thought upon prosthetic subjects is precluded, and mechanical dentistry is considered only a temporary employment at best.

There is no reason why anyone in general practice should not have interspersed throughout his operative work many cases of prosthetic dentistry without feeling that he has neglected any of the operative features of his practice, if it be systematized and carefully carried out in its different stages. That the best results in dentistry can be obtained by specializing is undeniable. Specialization will surely be attended here by that state of development and perfection which is arrived at by other specialists.

It has been my custom in the past to do more or less consulting work in addition to my regular prosthetic work and office practice, and either outline a plan for someone who does not care to do mechanical work—charging a consulting fee—or take the plan as described upon the plaster model and do the work in my own laboratory for those who are not disposed or equipped to do this kind of work at all; in either case I act in the capacity of a consulting engineer in combination with my practice.

The point I wish to bring out is that at present there seems to be a strong tendency on the part of dentists to regard prosthetic dentistry as inferior to operative dentistry. This is a very erroneous view, for we all know practitioners whose reputation as operators is national, and yet these same men could never during their career make a creditable denture with their own hands, and I maintain that the mechanical dentist, if he be a clever one, is a man of more parts and greater accomplishments than the operator whose feats of dentistry are performed only at his chair.

I have watched the effects of this attitude for years, and early in my experience prophesied the state of affairs that has come to pass. Operators whose productions have in the past been wonderful now claim the authorship of mechanical work which is a disgrace to our profession. Why? Supposedly because they became too busy at the chair.

This effort to build up an office practice is of course entirely legitimate, but after the skill of the operator has been expended, after the pathologist has reached the limit of his power, the need for the prosthetist is just as great as ever, and it appears that his ability has diminished by reason of the fact that many dentists now think that it is more dignified and more profitable to be an operative dentist, and are willing to see a branch of dentistry to which we must ultimately turn fall almost into disuse, except in rare instances or cases of absolute necessity.

With but few exceptions prosthetic dentistry has never been regarded with sufficient appreciation from an artistic standpoint, and the term "mechanical dentistry," while in itself an eminently dignified one, has of late years correctly defined the productions of the average worker. These productions are mechanical in the strict sense of the word, but not in the least artistic, and these workers therefore have been justly called "laboratory men."

Accuracy of plan and detail are ever apt to be neglected, whereas they should be uppermost in the mind of the prosthetist in all his efforts. Each step should be worked out with great care, and no detail neglected that is conducive to accuracy, artistic design, and technique in reproducing nature.

Those who have aspired to something better than ordinary results have found themselves handicapped by the fact that the raw material is in many instances in the hands of mechanics, who are not artistic but have sometimes rare manipulative skill, and who as a rule give the dentist what he calls for.

Our dental schools have never taught mold-making, and the dentists have never thought it important enough to learn it, consequently the profession has unconditionally accepted the available materials, thereby signifying its willingness that the production and standard of accessories and materials pertaining to mechanical dentistry should evolve at random.

Mold-making, the trimming of the mold, and its preparation from natural teeth should be taught in every dental school in this country, and if but one man out of each class made use of his knowledge in this direction, we should soon have a colony of artists, who would be not only a help to us as a profession but could be drawn upon by the dental manufacturing companies to their advantage.

Our profession should assume the attitude of placing its members in control of the situation with reference to prosthetic dentistry; it should exhibit an unwillingness to have that branch lag behind other arts. It is with this idea alone that I am speaking, and to this end I have written in the past, not animated by a desire to criticize anyone's best efforts. I see this subject solely from a dentist's viewpoint, not from the standpoint of the manufacturer who caters to wholesale trade.

I am thoroughly convinced that if the student were directed in the beginning along artistic lines, and his technical training with adherence to intelligent planning were not neglected, he would not only be attracted to prosthetic work but would enjoy every moment spent in the laboratory. The field is unlimited, and the variation is wider than any other department of dentistry offers. If his work is up to the standard which I have in mind, the prosthetist can render a greater service to the patient, and can certainly obtain a greater degree of satisfaction to himself, than is the case in any other province of our profession.

Crudeness in our method of procedure is inartistic and will be noticed by our patients, and in many instances resented. The patients subsequently engage some other practitioner in search for something which is to them indefinite, but once they are treated with tact and consideration they will show their gratitude much more readily than they display their displeasure.

I distinctly recall a case in which I had made a very extensive piece of work, covering altogether a period of about five years, and embracing everything from a very small partial gold denture—to which I added from time to time as changes occurred—to the entire denture after all the teeth had been lost. When the entire denture had been completed my patient said, "I am very grateful, doubly grateful, but I do not know whether I am more so for what you have done for me or for the way you have prepared me for a condition which, while a shock to me, has made me more comfortable than I have been for years or than I thought I could be."

If patients have been properly cared for from the prosthetist's standpoint, there is hardly any instance in which it is necessary to allow them to leave the office with a vacant space that shocks them or their friends, and the old method of sending a person home to wait for six months or a year after extraction before making a denture should be unheard of at the present time.

Returning to the subject of mold-making as a factor favorably influencing the dentist and his production: If this subject were taught, there are a great many ways in which artistic considerations could be applied not only in the preparation of the models and the molds themselves, but in the blending of the colors in order to break the uniformity of shades.

A method often employed at present in trimming or carving a mold is to lay a graver across it as a fulcrum, then, with a sweeping stroke of the graver in the right hand, to make a cut, whenever it is possible, from one edge to the other, thus obliterating every artistic line in the mold. This should be avoided at all times, for the lines of the tooth embody curves and half-curves, just as much as the general color embodies tones and half-tones. The method I have just described will therefore take away all character from the mold.

Moreover, the one who cuts the molds takes the plaster model and carves the brass so that the plaster tooth will fit perfectly. In this way each tooth is made uniform and of the same general appearance as the corresponding one on the opposite side of the mouth, which is largely responsible for the lack of character exhibited in the average set of teeth, both before and after they are adapted to the average case, unless fittingly modified by the dentist. There is in reality a great difference in size and shade between the various corresponding teeth as they occur in the mouth under normal circumstances, and this feature should be duly considered in the making of artificial teeth.

It is possible to break up the shade of a tooth to suit a given case by judiciously placing the body and the enamels in the mold. In fact, there are many ways of obtaining unusual and artistic effects if the average dentist but knew the first principles of mold-making, and doubtless better workers and better molds would be evolved if this subject were a part of our dental education.

Anyone desiring to reproduce a set of natural teeth from a model can do so readily by cutting the teeth apart with a fine saw and adding wax to the extent of one-sixth to the length and width of each tooth to compensate for shrinkage. This is always necessary if it is desired that the teeth be duplicates of the natural ones from which the mold is made. The wax is generally added to the cutting edge and one side so that the shrinkage will be uniform.

I keep a plaster model reproducing my own six anterior teeth ready to be cast. From such a record model, or from extracted teeth artificial substitutes, can be molded in such a way as to reproduce faithfully the original natural teeth.

A good deal has been written about anatomical molds in recent years, and it would seem as though every dentist has suspended progress to await their coming. This to my mind is a mistake, because, while the anatomical mold as prophesied and as many expect to see it would simplify many steps of our work, there will never be a time when the dentist will not have to expend upon porcelain teeth his individual skill to make them applicable to the case in hand. Therefore education in this direction either before graduation or in a postgraduate course will give the student a tremendous advantage and furnish the graduate with additional resources.

While on former occasions I have criticized and probably shall continue to criticize the manufacturers' product whenever I feel called upon to do so, I consider that the real criticism falls upon the dentist himself, upon the dental profession in general, because the average dentist is apparently willing to accept any product offered by the manufacturer.

The subject of this paper has been nearest to my heart and has inspired my work along these lines for twenty years, during which time I have perfected the details wherever it was possible, and systematized my methods. Not that others before me have not devoted their efforts to this department of dentistry; but the results I have been able to attain by employing certain methods have been so encouraging as to inspire me with the hope of a great future for prosthetic dentistry. There is no excuse today for mechanical dentistry being practiced in any other way. I mean by this that there is no excuse for poor results or for the employment of certain old and inartistic methods.

Many practitioners have never been able to regard prosthetic dentistry as artistic, partly because of a lack of a system of instruction from an artistic viewpoint and very largely because of a lack of genuine interest.

WHY PEROXID OF HYDROGEN FAILS TO WORK.

By DOUGLAS H. STEWART, M.D., New York, N. Y.

Of course the title of this paper includes also the answer to the question—"How can it be made efficient?" It has been suggested that a recent essay embodied facts which were of value to dentists, and that if a word or two were changed here and there the information contained would become available.* It has seemed better to me not to mail mutilated reprints, but to work anew and lay my findings directly before the specialists interested. Hence this little article and publicity assured it, as appearing in Cosmos pages.

For brevity's sake statistics will be omitted, as the findings may be easily verified. Parke, Davis & Co. prepare culture tubes of blood serum, and germs may be grown if placed near an ordinary steam radiator so that the temperature shall not fall below 80° nor rise above 110°. Place a thermometer so that you may glance at it occasionally. Good practical experimental work may be done in any office, and this with a minimum of time expenditure. Experimentation along this line will quickly convince one that as to the ordinary mouth-washes, their results and their claims (labels) are distinctly at variance, but if those claims are tested in a glass tube containing watery solutions they may be found quite accurate. The discrepancy is caused by the fact that the human mouth, with its mixed saliva, is as unlike the test tube and its contents as anything that may be imagined.

Peroxid of hydrogen is selected simply because it is widely used, because theoretically it should do good work, and because it fails to act as it should. It should be an excellent germicide. Its bubbling and foam are impressive; it bleaches; but a few tests with culture tubes and cultures taken from any contaminated mouth will show the germ status of that mouth to be unchanged—before and after using. The reason of its failure is that its oxygen is given off outside the cell wall, and does not penetrate to the germ within. It simply cleans the field so that the germs will not be hampered in any way. Roughly speaking, the action might be exemplified by putting some salt in a sealed rubber bag and putting this in a pail of water. Then agitate the water as you will, and no salt will be dissolved; your solvent will be inert. But pour some chloroform on the rubber bag or otherwise tear it to pieces, and the salt would be acted upon by the water at once.

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* "Aseptic or Antiseptic Hands in Obstetric Practice? Which? and Why?" (American Association of Obstetricians, Louisville meeting, September 26, 1911.)

In some experiments with boiled water that water was boiled constantly for one week, at the end of which time it was not absolutely sterile. But if washing soda be added to the water it tears the cell to pieces, and sterility ensues at once. There are germs in spore form that will withstand boiling in plain water, but not if borax or washing soda be incorporated. The point is, that while the alkali has no antiseptic value, the antiseptic is inert until its path is prepared. Yet the usual peroxid solution is and must be acid, otherwise it would not keep. Compare the peroxid to an army and yourself to its commander. Will you send your soldiers against a fortified town with magnificent ramparts, or, the choice lying with you, will you send your forces against the same town after an earthquake—the soda—has torn those ramparts to flinders? Will you send your peroxid against a germ with an intact cell wall or against a destroyed cell wall and an unprotected germ? If germs act by a process akin to peptonization, a very good weapon against them is a process akin to emulsification. But emulsification requires an alkali, and alkaline solutions of the peroxids are very perishable. This is true, but you do not particularly care to keep the solutions on hand in a bottle, and you do require a solution so perishable that it acts in the mouth at once. In other words, perishability and efficiency are here synonymous terms.

It is quite impossible for me to do much more than scratch the surface of this subject, so I will just give one way—out of many—in which one may easily obtain a fresh, active, and alkaline solution of H_2O_2. To discuss the advantages of the nascent peroxid contained in the solution in action would require too much space. One of the sodium salts is the perborate. The one I experimented with was a Merck product. It is stable, easily handled, and has the advantage that if a solution is desired, all that is necessary is to take a given quantity of water and add more than enough of the salt so that there remains more or less of an undissolved residue. Two per cent. strength is sufficient, and saturation is always a little stronger than that. Mixed saliva, detritus of food, etc., decompose it readily and it gives up $H_2O_2 + O_3$ and borax—other reactions also. A tablespoonful, more or less, of this solution held in the mouth, worked through the teeth and into every nook and corner for five minutes will convert a stinking mouth into an odorless one. It is an antizymotic as well as a bactericide. It tears ferments to pieces. It makes disarmed soldiers, so to speak, of the forces which aid the germs.

SUMMARY.

Peroxid of hydrogen is more or less inert because it cannot penetrate a cell wall, in the acid solution commonly used in the mouth.

It is active in an alkaline solution, because the alkali can destroy the cell wall and expose the germ to direct action. It is perishable, and should be made daily.

Germs soften (melt) tissues by a species of peptonization. In the digestive tract peptonization—gastric—is stopped by emulsification—intestinal. We imitate this process of nature by introducing sodium into our solution.

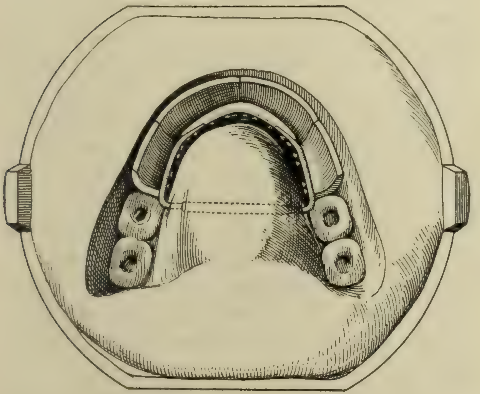
HOW TO PREVENT FRACTURE OF GUM SECTIONS.

By **J. L. ELPHINSTONE, D.D.S., L.D.S., Aberdeen, Scotland.**

THE secret of prevention of fracture of gum sections lies in grasping the principle that the porcelain is fractured by the warpage of the vulcanized rubber, and in applying such principles as will render harmless this absolutely certain shrinkage.

The front facings can thus be prevented from breaking, both during the making of the plate and subsequently while the plate is in use by the patient. I find that bicuspid facings are less liable to break.

FIG. 1.

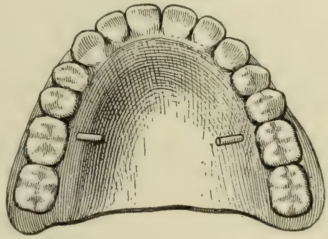


Case invested in plaster and wax washed out. Showing strengthener *in situ*, also strengthener raised to vertical for convenience of packing rubber. Held in position in this way it cannot change position and seldom shows on the surface.

I embed in the vulcanite plate a horseshoe strengthener, immediately within the platinum pins. The central part of this strengthener, which lies snugly behind the six front teeth, is very strong; a much weaker piece is soft-soldered to each end of the strong center piece.

Let us reflect now on the effect of such a strengthener. The inevitable warpage takes place; it finds a weak place between the canine and bicuspid, where it warps freely and does no harm, but the six front teeth are protected by the inexorable strengthener. The essential virtue of this strengthener lies as much in the weak part at the junction of the canine and bicuspid as in the strong center part.

FIG. 2.

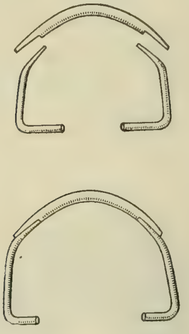


Shows waxed-up plate with ends of strengthener emerging to secure hold in plaster when invested.

A strong strengthener extended all around does not answer the purpose. The warping vulcanite would obtain a secure leverage at the ends and bend such a strengthener as a whole, fracturing the porcelain just the same. As a rule, I use platinoid wire No. 11 for the center piece, and a much thinner gage for the ends. I employ only soft solder to join them, since hard soldering very much reduces the stiffness of any wire. For security of soldering, the ends are joined overlapping. This No. 11 gage seems to suffice for most plates, but when the vulcanite is very thick, I have used even stouter oval wire.

The strengthener is best embedded in wax at the time when the plate is waxed up, bending the thin, extreme ends of the strengthener at right angles so as to make the ends project from the wax and secure a hold in the plaster after the case is flasked. This I have found the most convenient means of preventing the strengthener from changing its position. After vulcanizing, these protruding ends are cut off.

FIG. 3.



Strengthener before and after soldering. Center, No. 11 platinoid wire; ends, thin platinoid wire.

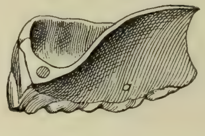
A stout strengthener like this means that the plate must be thick just within the sections on the top of the ridge. Thickness in this locality on the lingual side of the six front teeth is desirable for the sake of perfect articulation.

In addition, the edges of the sections should be beveled from within outward, so as to prevent the vulcanite, as it warps, from gripping any square edge. In waxing up, the wax should never overlap, not even slightly, the margin of any section.

Sections, of course, might also be broken by the indiscreet use of the screw press. The automatic spring press, which closes the flask in the vulcanizer and while the rubber is still quite soft, will entirely prevent this mishap. Should the fracture have occurred from this or any other cause during vulcanizing, the rubber enters the crack and appears dark, while a fracture from warpage, on the contrary, has no rubber in it and indeed is often almost imperceptible except on careful examination, since such a fracture occurs necessarily after cooling is advanced or complete, and when the rubber is too hard to enter any crevice.

The following additional precaution against the effect of warpage may be taken; I cannot say definitely if this is necessary, but it may do good and can do no harm: Immediately on removing the plate from the flask upon completion of the vulcanization, the sections should be heated uniformly and gradually until they are too hot to be held with the hand. It may be assumed that by this operation the strain of the gathering warpage of the rubber is released. The same operation should be repeated as the last procedure before the plate is handed to the patient.

FIG. 4.



Section of finished plate, showing strengthener in position. Also showing the beveled margin of gum section.

I find diatoric gum sections quite satisfactory for the bicuspids, but previous to applying these anti-fracture principles I found them to produce failure in front teeth. The sections broke either in the making of the plate or subsequently when used by the patient; consequently I discontinued their use. Quite lately, however, I have made a few diatoric sets again, putting these principles into application, and have had no fractures as yet. The trials, however, have neither been numerous nor prolonged enough to warrant me in definitely recommending diatoric gum sections for front teeth.

When these diatoric gum sections fracture, the individual broken pieces soon come away from the plate; when pin gum sections fracture, the pins usually keep the broken pieces in place.

In many cases diatoric sections would render the same service as pin facings, provided always that fracture can be prevented.

I have read in a dental journal the description of a method of filling-in the joints of gum sections with porcelain, and fusing it in the furnace. Such a method, I fear, could only be applied to the two front sections.

The inevitable contraction of the rubber does not allow us to extend the strengthener farther than the six anterior teeth.

DEVICES AND VOLUMETRIC TESTS FOR SALIVARY ANALYSES.

By **PERCY R. HOWE, D.D.S., Boston, Mass.**

THE accessibility of the secretions of the salivary glands renders them particularly favorable for examination by students of physiological problems. These investigators have determined the anatomical and physiological relations of these organs, the nature of their secretions, and the stimuli that incite their flow. Evidence of the selective properties of cells of special office is also shown here, and is considered typical of the act of secretion as naturally performed throughout the organism.

DeGraaf's interesting experiments on dogs, afterward utilized by Pawlov, graphically show that not only do various foods cause a flow from different glands, but that the mere sight of meat provokes a viscid secretion from the submaxillary glands, while the sight of powdered biscuit arouses activity in the parotid glands, or a thin watery flow from both.

VARIATION IN SALIVAS FROM DIFFERENT GLANDS.

It is of especial interest to analytical workers on the oral secretions to note that the chemical and the physical characteristics of the salivas from the different glands are dissimilar. The parotid saliva is thin, contains albumin, globulin, and ptyalin, but no mucin, while the submaxillary saliva consists of mucin in a weak salt solution. The two salivas, when separately collected and poured into a test tube, do not readily mix; that from the submaxillary glands lies superimposed upon that from the parotids.

One marked difference that the writer wishes to point out is that, contrary to the usual opinion, the saliva drawn directly from the parotid glands is decidedly acid, while that from the submaxillary and the sublingual glands is neutral, slightly alkaline, or slightly acid.

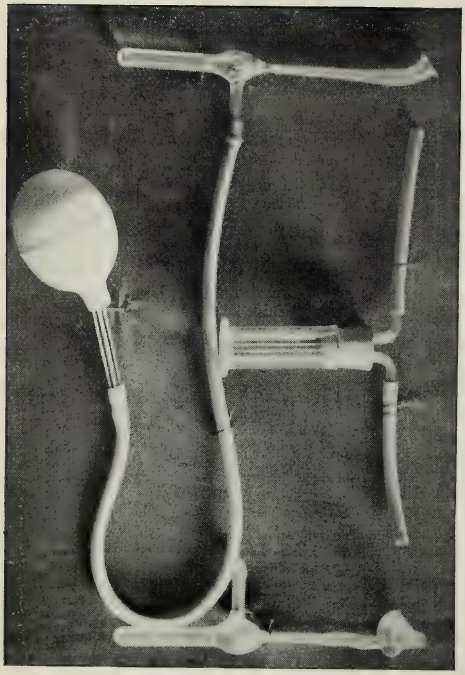
This conclusion is the result of many examinations conducted according to the method described in an article entitled "Indicators in Salivary Analyses," published in the DENTAL COSMOS for March 1911, and which the Committee on Research of the National Dental Association have in part adopted, with an additional recommendation that only serves to increase the acid findings.

Such considerations as these, together with the facts, obvious to every chemical worker, that isolation of the body to be examined is a very material help in an analysis, and that the individual properties of salivas drawn directly from their ducts are to be more clearly seen, make it seem that the following description of apparatus for accomplishing this might embody ideas profitable to salivary research workers. It is also thought that the volumetric analyses here given will prove to be accurate and dependable additions to the technique already advocated, and of value for reference, if for no other reason.

SALIVA COLLECTING DEVICES.

The first illustration represents collecting devices. One of these is designed for the collection of the parotid saliva, and consists of a glass tube with a mouthpiece suitable for covering the orifices of the ducts. (See Fig. 1.) This extends down into a receptacle capable of holding two centimeters, from the side of which receptacle extends an outlet tube for emptying the contents when full and for the attachment of a bulb and tubing by means of which a mild suction is created during the collecting.

Fig. 1.

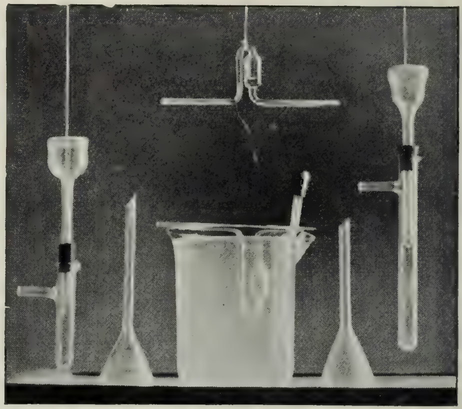


Collecting devices.

The apparatus used in the work upon the submaxillary and upon the sublingual glands is similar, with the exception of the mouthpiece, which is adapted to the requirements. In use it is necessary to place cottonoid rolls or other absorbent material over the parotid ducts to prevent the saliva from these glands from being included in the specimen.

On account of the nervous control of these glands it requires some practice and diplomacy to get the patients into such an attitude as will cause and not check the natural secretory flow. The mouth and teeth should be thoroughly cleaned by repeated rinsings with distilled water, and the tissues in the vicinity of the orifices of the ducts should be carefully scrubbed and again washed with distilled water. The instruments then, being scrupulously clean, are placed over the outlets of the ducts, squeezing the bulb to create a mild suction. In this manner the saliva is slowly collected; it is very clear, and is ready for analysis.

Fig. 2.



Pycnometers, suction filters, and manner of raising saliva to proper temperature.

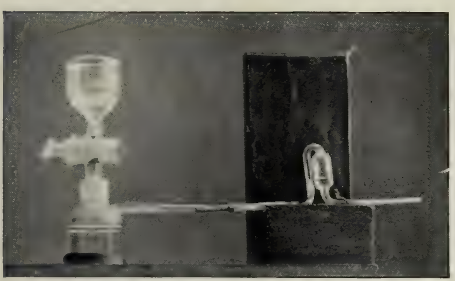
The collection chamber to be seen in the center of the illustration is for attachment to the saliva ejector, and is an excellent means for obtaining a quantity of the oral secretions during a filling operation. To one glass tube is attached that part of the ejector tubing leading to the mouth; to the other a short piece of tubing connecting with the ejector pump itself. When one chamber is filled another can be substituted, so that a very considerable quantity of saliva can be obtained.

METHOD OF DETERMINING SPECIFIC GRAVITY OF SALIVA.

The next illustration (Fig. 2) represents a small pycnometer marked to hold exactly one-half centimeter. The small end of the tube is capillary, and to it is attached a piece of small rubber tubing. The instrument is filled by suction, when the tubing should be removed. After making sure that there are no air-bubbles, the pycnometer is placed in a beaker of water sufficiently heated to bring the temperature to 36.8° C. It is then wiped dry on bibulous paper and waved in the air once or twice to insure further dryness. The saliva is then drawn down by a bit of absorbent material, touching the capillary end of the tube, until the bottom of the meniscus is exactly on the graduated mark. It is then weighed in the balance and the specific gravity found according to the formula—

$$\frac{\text{W't filled with saliva} - \text{w't in air}}{\text{W't with dist. } H_2O - \text{w't in air}} = \text{Sp. gr.}$$

FIG. 3.



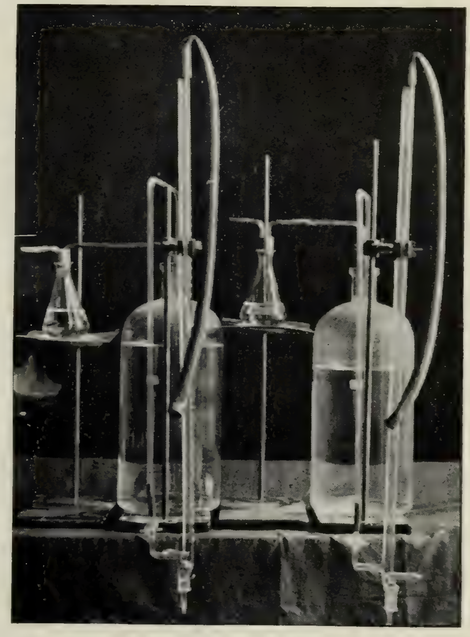
Viscosimeter.

A small suction filter that is very useful is sufficiently described by the photograph; it is designed for connection with the saliva ejector. Small funnels, etc., are also shown.

THE VISCOSIMETER.

The specific gravity found, the pycnometer is next attached to the viscosimeter, as shown in Fig. 3. This consists of a graduated reservoir for holding water, from the bottom of which extends a tube provided with a stopcock and having attached to it a ground glass stopper, so that when inserted in the neck of the receptacle below, the tube reaches nearly to the bottom. From the side of the receptacle extends a tapering tube, to which the pycnometer is attached by a small piece of rubber tubing. The graduated reservoir is filled with distilled water, the stopcock turned, and a little of the water allowed to run through to drive off the air and to bring the water to the graduated line. The stopcock is then closed, and the piece inserted in the lower receptacle. This is so filled that the water reaches a graduated mark close up to the side tube. A beaker is placed at the end of the pycnometer to catch the saliva, the stopcock opened, and the time required to empty the pycnometer taken, comparison being made with the time required to empty it of distilled water under the same adjustment. The

FIG. 4.



Apparatus for storing volumetric solutions.

result may be mathematically expressed in the same way as in determining the specific gravity.

Up to this point the saliva is still fit for analysis. The manner of storing volumetric solutions after being standardized by titrations is also presented, as are the means for filling burets without effecting alterations in the solutions. (See Fig. 4.)

VOLUMETRIC ANALYSIS FOR DETERMINING PHOSPHATES.

The methods of definitely determining the degree of acidity or of alkalinity having been previously discussed, and the way of estimating the specific gravity as well as the viscosity having been pointed out, a volumetric analysis for phosphates adapted to amounts of saliva of from ½ to 2 or 3 c.c. is next to be considered.

In analytical work in kindred scientific investigations it is customary to estimate the phosphates present as phosphoric anhydrid (P_2O_5).

The following solutions are prepared:

7.10 gm. uranium nitrate; 5 c.c. strong acetic acid; distilled water to make a liter. (1 c.c. = 0.001 gm. P_2O_5.)

1.176 gm. microcosmic salt; distilled water to make a liter. (1 c.c. = 0.0004 gm. P_2O_5.)

A fresh solution of ferrocyanid of potassium: 100 gm. sodium acetate to a liter.

It is necessary to verify the strength of the uranium solution by titration against the microcosmic salt solution. The burets are filled. Into a test tube containing 5 c.c. of the microcosmic salt solution enough of the uranium solution is delivered—adding by tenths—so that when a drop of the solution, placed upon white porcelain, is touched with a glass rod moistened with ferrocyanid a chocolate color is produced. The amount should be exactly 2 c.c. The accuracy of the solutions being assured, they are ready for actual work.

Procedure. Take 1 c.c. of saliva, add 1 c.c. of alcohol, warm, and filter. The alcohol coagulates the albumin and the mucin. Add two drops of the sodium acetate solution; this is to take care of any free nitric acid that might exist in the uranium solution. To the filtered solution add by twentieths the uranium, letting it drop into the saliva with precision, and then shake with a stirring motion. Place a drop on white porcelain and touch it with a glass rod moistened with ferrocyanid of potassium. At the appearance of the chocolate color, read off the number of tenths used, and multiply by 0.001, which gives the number of grams of P_2O_5 present. The color change is decisive, and the determination can be reached with accuracy. Clean instruments and neatness of technique are of course requisites for delicate reactions. Chemicals of the greatest purity are also essential. Testing immediately upon drawing the saliva is of the greatest importance for correct determinations.

DETECTION OF CARBONATES.

Carbonates I have not found in the uncontaminated parotid saliva, nor could they exist while any degree of acidity is maintained. They may be found in the submaxillary and sublingual saliva. The addition of any acid sets free the CO_2, which may be seen under the microscope, or, when a large amount is analyzed, by allowing it to displace water in a tube closed at one end.

DETECTION OF SULFATES.

Sulfates in such quantities as we are dealing with, viz, from ½ to 2 c.c., are too small for measurement, but at times their presence may be detected by adding alcohol to the saliva, warming and filtering, acidulating with a drop of HCl; then adding by drops, giving time for the reaction to take place, barium sulfate solution of the strength of 30.54 gm. to one liter. A white precipitate indicates the presence of sulfates.

VOLUMETRIC DETERMINATION OF CHLORIDS.

Chlorids may be determined volumetrically in these small quantities of saliva. The following will be required—

N/20 silver nitrate solution titrated against N/20 sodium chlorid solution for verification; sodium carbonate solution, and chromate of potassium solution.

Procedure. Prepare the specimen by adding an equal quantity of alcohol, heating, and filtering. Render alkaline by adding a drop or two of the sodium carbonate solution, then run the silver nitrate from the buret into the saliva by tenths, until the yellow color changes to a faint red. Note the number of tenths to effect the color change and multiply by 0.003, the result indicating the amount of chlorids present. Some experience is necessary for determining the exact point of color change, and a colorimeter is helpful.

VOLUMETRIC TEST FOR CALCIUM.

One other volumetric test that may be used in this work is that for calcium. The necessary reagents are—N/10 permanganate of potassium; N/ oxalic acid; strong ammonia, and dilute sulfuric acid.

Procedure. To one or two centimeters of saliva are added equal amounts of distilled water and of normal oxalic acid. Sufficient ammonia to render this mixture slightly alkaline is then added, the whole heated to the boiling-point, and then set aside in a warm place for the precipitate to settle. Filter through a hard filter, for it is difficult to remove all the precipitate of calcium oxalate from the solution. This is to be followed by washings with hot distilled water. The filter, together with the precipitate, is then put into a test tube, and the funnel rinsed into it by freely using dilute sulfuric acid. This is then titrated with the permanganate of potassium until a permanent pink color appears. This should be done at a temperature of from 60° to 70° F. An excess of acid must be present in the titration process:

Each c.c. of N/10 permanganate = 0.0028 gm. CaO_2.

CONCLUSION.

It is not the purpose of this article to discuss the significance of the various bodies found in the salivary fluids, nor to point out the means for effecting various chemical and physical changes. That it is possible to do this is evident to those who have made this matter a subject of study, but to set forth the principles for intelligent and practical application would be a task of too great length to be here included. There is much to be said in support of the belief that no field of oral research is so fraught with possibilities for supplementing the fund of information that bacteriology has given us as is that offered through the chemical and physical study of the oral secretions by physiologists.

THE SEGMENTAL GOLD PLATE.

By WM. W. ATKINSON, Philadelphia, Pa.

THE MAGIC OF GOLD.

HOW wonderful is gold, and how much it means to dentistry! The battery deposits it pure and beautiful; then, melted and cast, it becomes an inlay. The goldbeater, with hammer and cutch, spreads and thins it, and it is gold foil. The chemist converts it into purple of Cassius, and it imparts a natural pink color to gum enamels. The manufacturer alloys it, carries it from furnace to ingot-mold, passes it through the rolls or draw-plate, and it is gold plate, solder, or wire, with all the needed range of qualities and karats.

THE PHYSICAL PROPERTIES OF GOLD.

One of the most valuable uses of gold in plate form is for gold dentures. The gold denture possesses great artistic possibilities, is strong and clean, and has thermal and electrical conductivity.

Proof, however, is furnished by imperfect methods of making gold dentures that gold, though tractable when worked understandingly, resents any attempt to ignore its physical properties. What are those properties? Chemistry tells us that some substances are amorphous—that is, they lack *structure,* having mass but not form; that others are crystalline, having form as well as mass, *i.e.* their molecules are built up into shapes known as crystals. These crystals are formed when a melted metal cools and becomes a solid. When alloyed gold is "rolled" into plate, the crystals are elongated and flattened into leaves or laminæ, so that a sheet of plate gold may well be likened to a group of flattened sections of fine wire, slightly interlaced, parallel to each other and to the sides of the rolled sheet of metal, and held together by the force of molecular cohesion. (Fig 1.)

While the ingot of the metal was thick, the leaves are thin and long in the light gages of plate as employed for dental work. If the metal has been frequently and properly annealed the tension of compression has been relieved, and the leaves are not broken in rolling, which would cause small checks in the plate gold to develop later in the swaging into fissures, and the metal becomes tough and has tensile strength.

When their equilibrium is disturbed, as by bending, the leaves show the property of resilience—that is, they return by molecular attraction to a state of rest. The leaves are also malleable and may be beaten into the inequalities of the die to which they are to conform; they are ductile, and will flow or stretch under the coaxing of the counter-die over and around the projecting surfaces of the die.

These seemingly paradoxical properties are due to the qualities of the metals used, independent of their crystalline structure. Thus arsenic is crystalline, yet is extremely brittle. The adaptation, therefore, of sheet metal to given forms by the operations of malleting, spinning, or compression between dies and counter-dies, as in dentistry, is by no means a simple mechanical problem, for the elongated crystals must be considered before any attempt at scientific construction can be made.

DISADVANTAGES OF THE OLD METHOD OF SWAGING ONE-PIECE GOLD PLATES.

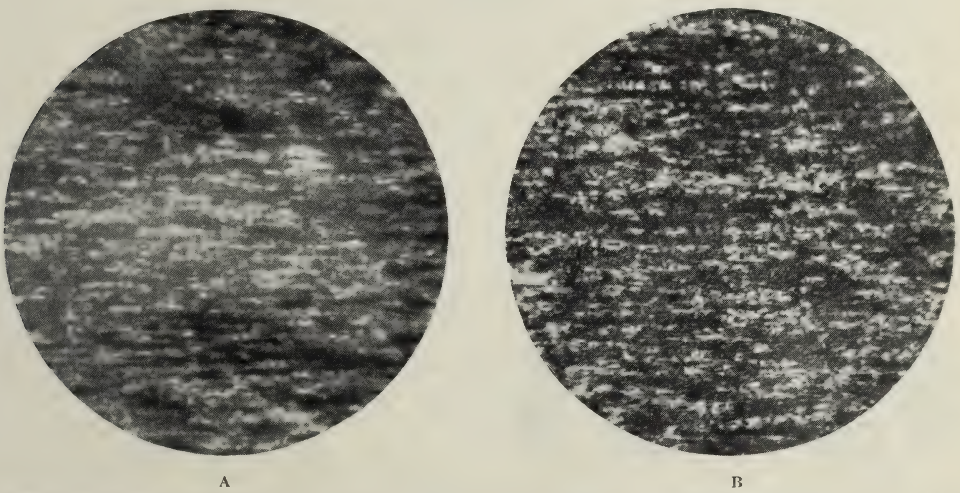
Heretofore, in the making of an upper gold denture, the plate was cut from one piece of plate gold, excepting, of course, the vacuum chamber lid, the rims and stays. No. 26 (Brown and Sharpe gage) was considered the minimum gage for an upper plate, and No. 24 gage the minimum for a lower one. These plates lacked stability or were flimsy when lighter gages were used. The plates thus made from one piece of plate gold, "fluted" over the region of the canine eminence or at the frenum, and over the condyloid prominences at the ends of the alveolus.

In this working method the law of "impenetrability of matter" is ignored in an attempt to make "two bodies of equal dimensions occupy the same space at the same time," for at the points mentioned we strive by malleting and swaging to crowd the laminæ sidewise and flatten the bends or "flutes," which are inevitably raised, so that the rim may lie smoothly along the outer ridge of the die. In the above operation the ductility of the gold works to the disadvantage of the plate, for the rim is "wiped" into place by the indirect pressure of the counter-die, and thereby thinned over the summit of the ridge.

The resilience of the laminæ contributes a tendency to spring away at parts of the edges, and the most careful work, with the aid of shot-swagers and compression machines, is inadequate to overcome this fault.

A striking illustration of the result of ignoring the law just cited is the seamless crown, that flimsy abomination that "your office boy can make in seven minutes" (!) In this instance a piece of metal, greater in dimension than the space which it is to occupy, is *forced* into the shape of a cup by means of a plunger and die-plate, and no microscope is needed to reveal the crimping of the metal contained in the collar, nor the broken organization of the laminæ at the bend between the collar and the floor or base of the thimble so made. Surely, the resultant crown lacks strength!

Fig. 1.



Showing structure of rolled gold plate. (Enlarged 50 diam.) A, Before annealing. B, After annealing. The direction and character of leaves (laminæ) are clearly shown.

Then there was the deeply undercut ridge to contend with. What visions of cores, special molding flasks, interlocked dies, and counter-dies, and no end of troubles, this conjures up! In this connection not only the physical properties of plate gold were disregarded, but a mechanical principle was violated in an attempt to drive the rim in by indirect compression over a vertical plane instead of by direct compression over a horizontal plane.

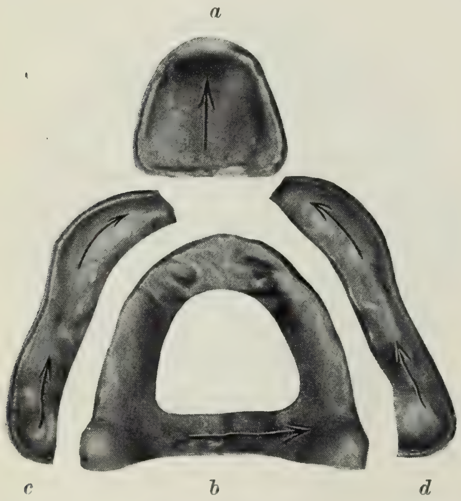
To sum up, the one-piece gold denture

is not a scientific device, because it conflicts with correct mechanical principles, and in its construction the physical properties of gold are disregarded.

THE SEGMENTAL GOLD PLATE.

Careful study of the above facts has led the writer to devise the segmental gold denture, which invention it is his privilege to give to the dental profession, with the hope that this new method may prove a stimulus to the making of this beautiful work.

Fig. 2.



Segments swaged and ready for assembling. *a*, Vacuum chamber lid. *b*, Roof segment with opening over which the vacuum chamber lid is to be seated. *c*, *d*, Right and left outer rim segments. (Arrows denote direction of laminæ.)

The plate is formed from several segments, one for the right and one for the left rim, divided at the median line and ending back of the condyloids, and one for the roof of the maxilla. (Fig. 2.)

When these segments are assembled with solder, the plate is so rigid that gold of No. 28 gage is sufficiently heavy for the vacuum chamber lid and for the rims, and No. 27 gage for the middle segment.

The patterns should be cut from the sheet gold in such fashion that the laminæ are bent into shape without compressing them sidewise and thereby disturbing their parallel relation in swaging.

The faces of all the dies used for the segmental plate are nearly horizontal, hence their pressure is direct, and as the dies represent sections of the mouth, the gold is not stretched over high places and in that way thinned.

The structure of the gold is utilized in this way: The patterns are cut for the outer segments or rims so that the leaves run lengthwise or from the frenum to the condyles. The pattern for the roof segment is cut so that its leaves run transversely from condyloid to condyloid.

The pattern for the vacuum chamber lid is cut so that the leaves run parallel to the median line of the "roof." This results in placing the axes of the leaves of the segments in opposition, the ends of the leaves of one section meeting the sides of the leaves of another, so that when the plate is assembled, it is rigid. (Fig. 3.)

IMPRESSION AND MODEL.

It is important that the impression and model should be so prepared that the plate, when finished, shall press firmly upon the soft parts of the mouth, but only lightly upon the hard parts.

All the hard parts of the patient's mouth are noted, and simultaneously the corresponding depressions in the impression are lightly scraped; then, in the same manner, all the impressions made by the rugæ are deepened.

The impression is stained and varnished and the model poured. Thin shellac varnish is the best stain; thin gum sandarac varnish the best separator. Grain alcohol solutions of both should be used, as cheap resins dissolved in wood alcohol are worthless. Soft-bristle brushes should be employed for applying these solutions, *never* camel's-hair brushes, and the varnish should be spread in a thin, even coat. Thick varnishes, or deposits of varnish allowed to collect in the depressions of an impression, will invariably ruin the fit of the plate. After separating the impression from the model, the soft portions in the patient's mouth are noted, and the corresponding parts of the model scraped, judgment being exercised lest the model be spoiled by scraping it too much.

Then, with a sharp point, the outline of the vacuum chamber is marked. If a rim is to be used to make a finish for rubber attachment, a ledge of wax is built around the outside of the model to form the rim. Then the model is coated with sandarac varnish and set aside to dry.

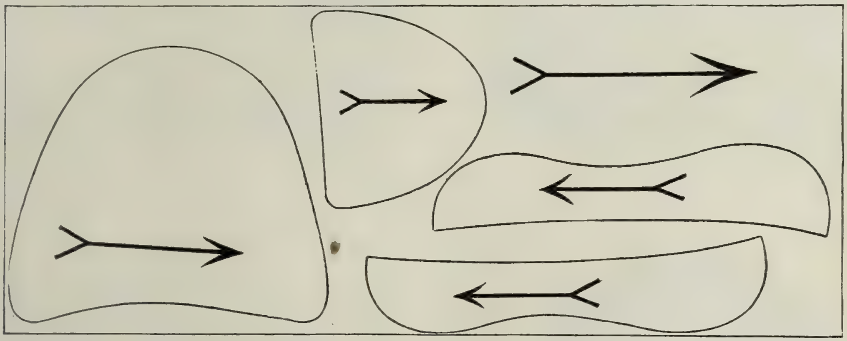
DIES AND COUNTER-DIES.

When the model is dry, two zinc or Babbitt metal dies with their counter-dies are made for the roof segment, also a fusible metal die for finishing.

The face of the dies should extend only as far as the outer edge of the summit of the alveolar ridge. The roof segment is swaged and the edge trimmed to a line drawn one-eighth of an inch from the outer edges of the summit of the ridge, and a bevel filed downward on this edge of the plate from condyloid to condyloid.

Then the vacuum-chamber portion is cut out along the line scored into the model. The segment is placed in position on the model, and a vacuum-chamber form of wax is built up over the opening made. The wax and the gold plate are coated with sandarac varnish and allowed to dry. From this a die and counter-die are made with which to swage the lid of the vacuum chamber, also two dies and counter-dies for each of the two outer segments, the molding of which is accomplished by placing the model sidewise and somewhat slanting in one section of a large molding flask and building molding sand around it until all of the model but the face to be used is covered.

FIG. 3.



Patterns, properly placed, on a sheet of gold. (Arrows point in direction of laminæ.)

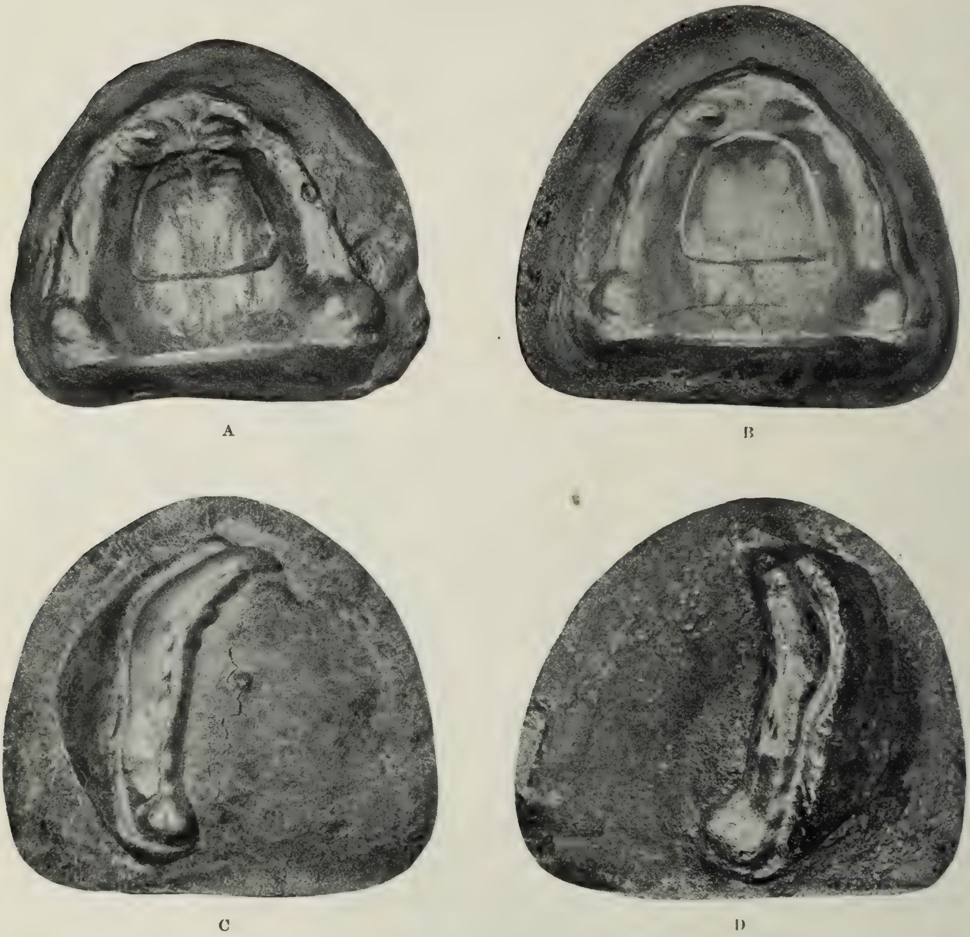
The sand is packed down smoothly and dusted with lycopodium powder. The other section of the flask is placed in position, and the molds are made. The lycopodium powder renders it possible to easily separate the flask without loosening the sand or model, and by placing another flask ring over it, the duplicate can be made.

By reversing the model and repeating the above process, the molds for the opposite outer segment can be made. The molds should include the beveled edge of the inner segment. (Fig. 4.)

ASSEMBLING AND INVESTING THE PLATE SEGMENTS.

After having swaged the outer segments and the lid for the vacuum chamber, the "roof" segment is carefully removed from the model and the varnish is burned off. Then, if 18-k. plate is used, the lid of the vacuum chamber is attached with gold solder "for 20-k."*

FIG. 4.



DIES. A, Die for roof segment, showing outline of vacuum chamber, previously scored into the model. B, Die for vacuum chamber lid, showing the wax form for the vacuum chamber lid and the outlines of the roof segment. C, D, Dies for the right and left outer segments, or rims, showing ledges for forming the turned edges in rubber-attachment work and also the beveled edge of the roof segment over which the outer segments are to be swaged. It will be noted that the faces of all of these dies are nearly horizontal—compression over them being therefore direct.

The writer, however, advises against the use of gold plate that is too hard, as it is difficult to accurately conform such gold to the inequalities of the die, and a hard gold has few advantages in the segmental denture—rigidity being attained as explained in other parts of the paper. It has been found that 18-k. gold alloyed with a composition of 80 silver to 20 copper or 20-k. gold alloyed with 78 silver to 22 copper best answers the purpose.

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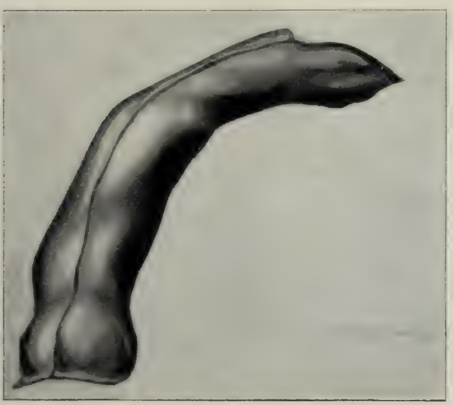
* For 18-k. plate the solders "for 20-k." and for 20-k. plate the solders "for 22-k." should be employed. Only standard solders should be chosen, which are about two karats lower in fineness than the plate for which they are stamped. The karat stamp is meaningless unless it is used by an honest manufacturer. The writer has assayed solder stamped "for 18-karat," and found that it possessed a fineness of only 13½-k. A standard solder stamped "for 18-k." should be of approximately 16-k., the dishonest product falling short by 2½ karats, which represents a *theft* of about 10¾c. per dwt.

It will now be found that the line of the edge of the "roof" segment is imprinted on the inner edges of the two outer segments. The outer segments are trimmed almost to this line. One of the outer segments is then carefully joined to the middle segment (roof) with sticky-wax, it being well to "brace" this by short pieces of iron wire laid crosswise over the rim and held by the sticky-wax. When the wax is chilled, the plate is lifted from the model and invested in dry whiting, packed around the upper edge of the rim and in and around the "roof" segment so that it will be firmly held during the operation of soldering; the portion held together with sticky-wax must, of course, be left uncovered, the whiting itself having been lightly pressed into a tin box of suitable size. (Fig. 5.)

FIG. 5.



Roof segment and right outer segment invested in whiting, ready for soldering. It will be noted that the turned edge of the outer segment and most of the inner surface of the roof segment are covered with the whiting, firmly packed down, in order that both segments may be secure during the operation of soldering.

This investment of dry whiting is indispensable. At first employing it as a mere makeshift for holding a clasp and tang during soldering, the writer now uses it for investing bridges to be repaired, where the teeth are not involved, for repairing crowns, for the attachment of clasps to metal plates, for the assembling of small bridges of either the all-gold or removable facing types, and for assembling the segmental denture. As the shrinkage of dry whiting is far below that of the plaster investment compositions, it follows that the assembling of prosthetic pieces by soldering can be more accurately done with that medium. The following rules should be observed: Dry, cold whiting must be used, since warm whiting softens wax. The piece invested must be dry, else steam will form in the subsequent heating and, in expanding, blow the piece out of the investment. The wax must not be picked, but burned off. Care must be exercised in packing down the whiting lest the pieces to be joined be disturbed in their adjustment.

SOLDERING.

The sticky-wax is now burned off with the brush flame of the blowpipe and the pieces of iron are picked off with tweezers. The flame is directed upon the part to be soldered until it is red-hot, borax is sprinkled over it, and the pieces are united with solder of the same karat as the plate. The plate is then removed from the investment, cleaned, and thoroughly dried.

It is replaced on the model, the opposite rim is tacked fast, and invested as before in a new lot of dry whiting. Whiting from the first investment, if warm, softens the sticky-wax and allows the segments to move when the plate is pressed into it. The other segment is then soldered as before, cleaned and dried. If the case is a single-gum, soldered denture, it is now ready for taking the articulation, or if it is one for rubber attachment, the stays or cleats may be attached with solder of a lower karat than that used in assembling. This latter operation being conducted on charcoal, investing is unnecessary.

By way of digression the writer would join Dr. Kirk in a plea for the beautiful single-gum, soldered denture. This type of denture is a "requirement" in our leading colleges and state boards. If its worth is thus recognized, why is it so sadly neglected after the graduate has established himself in practice? If properly made, this denture is artistic and natural in appearance, it may be cleaned and sterilized by boiling in soda solution, it is easily repaired, and will outwear many rubber attachments. It is an ideal appliance and requires the highest skill, both of which should be synonymous with dentistry.

When there are undercuts that interfere with the free drawing of the plate from the model, any small projections should be cut off or the model sawed two-thirds of the distance to the base and then broken into two parts. The parts can then be coaxed away from the plate, and the accurate fit of the plate is not disturbed.

A lower plate may be constructed in the same manner, but in cases where the alveolar ridge is deeply undercut on both the inner and outer surfaces, it is advisable to make four segments.

ADVANTAGES OF THE SEGMENTAL GOLD PLATE.

Careful observation of the practical use of the segmental plate has shown that it fits perfectly, is light in weight, and, by the opposing of the laminæ of the segments, makes an appliance of great rigidity.

The writer has made a number of segmental plates, all of which were successful; so that the segmental gold denture represents not an untried theory, but a system proved by experience.

PROCEEDINGS OF SOCIETIES.

NATIONAL DENTAL ASSOCIATION.

Fifteenth Annual Meeting, held at Cleveland, Ohio, July 25-28, 1911.

(Continued from page 354.)

THE CLINICS.

GOLD FILLINGS.

Dr. C. E. **Bellchamber**, Effingham, Ill. "Gold Filling."

This clinic consisted in filling a mesial cavity in an upper central incisor, using Williams' cohesive-gold cylinders for the greater portion of the filling, and finishing with Watt's crystal gold and platinum. The cavity was prepared according to the Black method. The filling was finished in the usual manner with stones, strips, and trimmers.

The Concerted Gold Filling Clinic.

A few brief details are necessary for an understanding of the results of this clinic. Before the introduction of *normal matrices* (the pearl matrices employed inhibiting delivery of abnormal blows), and *identical conditions* (cavities of uniform size being made by a special machine), and of the new *compressed-air test* for non-adaptation, acceptable comparative tests of the merits of the various methods of condensing gold had

Actual time in minutes and seconds.	Actual specific gravity.	Operators.	Time.	Margins.	Leakage.	Specific gravity.	Total.
		MECHANICAL MALLET.	%	%	%	%	%
12.15	17.44	Dr. E. H. **Allen**, Freeport, Ill.	94	95	100	100	389
13.00	17.02	Dr. **James W. Cormany**, Mt. Carroll, Ill.	91	95	90	95	371
16.45	17.32	Dr. **Charles Southwell**, Milwaukee, Wis.	82	100	85	100	367
		Average of mechanical mallet team...375.66					
		HAND MALLET.					
16.00	17.04	Dr. J. B. **Pherrin**, Des Moines, Ia.	82	100	95	100	377
10.00	17.52	Dr. J. V. **Conzett**, Dubuque, Ia.	100	95	80	100	375
18.10	17.28	Dr. **Perry B. Clark**, Columbus, Ohio.	76	100	95	100	371
14.30	16.66	Dr. E. P. **Dameron**, St. Louis, Mo.	88	95	95	90	368
		Average of hand mallet team.........372.75					

not been possible, and until the introduction of these concerted clinics, comparisons had not been reduced to exact figures.

This clinic was limited to the use of the hand mallet and the Bonwill mechanical mallet, the results being in favor of the latter method by a margin of less than three points.

The judges were Dr. C. P. Pruyn, Chicago; Dr. J. A. Libbey, Pittsburgh; Dr. J. R. Callahan, Cincinnati.

Presuming that the items of margins, time, and specific gravity as shown in the table, are readily understood, all details are omitted except those regarding leakage. The pressure was gradually raised to, but not beyond, 60 lb., the results obtained being as follows:

ALLEN. No leakage at 60 lb.

CLARK. Slight leakage through gold at 59 lb.

PHERRIN. One marginal leakage at 55 lb., another at 60 lb.

DAMERON. One small marginal leakage at 50 lb.

CORMANY. One small marginal leakage at 44 lb.

SOUTHWELL. One small marginal leakage at 36 lb.

CONZETT. Two leakages through gold at 22 lb. Two marginal leakages at 36 lb. Four additional marginal leakages at 50 lb.

For the rules governing this clinic, see *Dental Review*, November 1910, page 1124.

CASTING METHODS.

Dr. W. E. FRIBLEY, Chicago, Ill. "Root Restoration, Using Bohr Inlay Metal as a Basis."

The clinician first recommended the removal of the gum tissue by the use of trichloracetic acid. In case the root should require treatment, he uses a pure silver band of No. 32 gage as a matrix to support the root while under treatment. After the root is restored to a healthy condition, it is prepared for an impression. An iridio-platinum pin is placed in the root, and an impression in wax is made with the pin in position. This is then invested, the wax burned out, and the investment allowed to cool before the metal is cast, being careful not to allow the latter to become too hot. The cast inlay is then cemented to place in the root, and the restoration completed in any manner desired.

Dr. N. G. BOWBEER, Wyandotte, Mich. "Cast Inlays in the Deciduous Teeth."

The clinician exhibited a case of a boy of five years of age, in whose mouth he had placed nine cast gold inlays in the eight deciduous molars.

Dr. J. P. MARSHALL, Maplewood, Mo. "Manipulation of Gold in Dentistry and Jewelry."

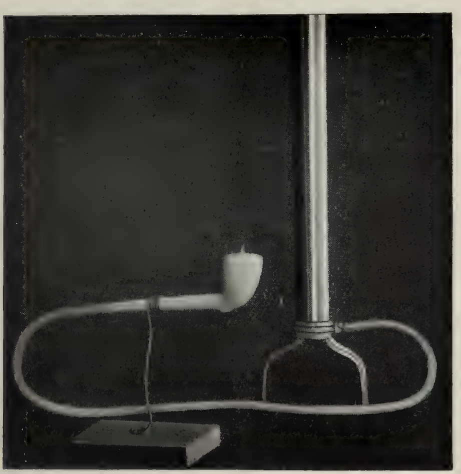
This clinic consisted of an exhibit of jewelry, crowns, bridges, inlays, reproductions of natural leaves, insects, etc., explaining the methods used in making the various specimens exhibited.

Dr. C. H. HEBBLE, Columbus, Ohio. "Preparation of Cavities for Cast Inlays."

Dr. Hebble exhibited models, in which cavities had been prepared as follows: Step cavity—mesio-incisal—in an upper left central incisor, cervical cavity in an upper canine, approximo-occlusal step cavity in an upper second bicuspid, approximo-occlusal step cavity in an upper first molar, occlusal cavity in an upper first molar, approximo-occlusal cavity in a lower first bicuspid, and an approximal cavity, lingual approach, in an upper lateral incisor.

Dr. C. S. STARKWEATHER, Bellaire, Ohio. "A Simple and Reliable Casting Outfit."

This casting device consists of a large bicycle pump, with the valve reversed so that it will produce suction when the handle is drawn up. The short tubing from the pump is removed, and replaced by a piece of tubing about three feet in length. A common clay pipe is used to invest the pattern in. Before placing the investment in the pipe, the opening at the stem is covered with a small quantity of asbestos fiber to prevent the investment material from filling the opening. After investing the wax model, the investment is dried out as in any other casting appliance. The pipe is then held in position with the bowl up, and the end of the rubber tubing is fitted over the stem portion of the pipe. The gold is melted in the crucible in the investment in the bowl, and, when it is sufficiently molten, the pump handle is drawn up, forcing the gold readily to place. The accompanying illustration gives an idea of the appearance of the completed casting outfit.



Dr. W. J. Boydston, Fairmont, W. Va. "How to Cast an Inlay When Your Casting Machine is Out of Order."

A piece of brass piping, from six to eight inches long and one and one-half inches in diameter, is secured and filled with plaster of Paris to within two inches of the top. The space left is then filled with soft putty or moldine, and over this are folded about six thicknesses of tissue paper. The investment is then heated and the gold melted to a white heat. The tube, containing the soft putty covered with the moist tissue paper, is brought directly over the investment, and about six or seven pounds pressure brought to bear on the investment, when the gold will be forced to place.

Dr. Otto J. Fruth, St. Louis, Mo. "Method of Making a Hollow Gold Inlay."

The cavity is prepared and a wax impression taken as for an ordinary cast inlay. After the wax model has been properly attached to a sprue wire, it is ready to be hollowed out. This is done by means of a Roach suction wax-carver. The advantages claimed for the hollow inlay are: (1) Better anchorage is obtained for the cement, (2) a larger bulk of cement can be placed over the pulp of the tooth, thereby preventing shock from sudden thermal changes, and (3) a great deal of gold is saved, as the bulk of gold in some cases is reduced at least fifty per cent.

Dr. William Mullin, LaGrange, Ill. "Method of Manipulating the Wax Model in Inlay Work."

A fine Swiss saw, such as is used in the laboratory, may be made very useful in manipulating the wax model after it has been carved and polished prior to removal from the cavity. A piece of the saw, three-quarters of an inch in length, is first heated in a flame and inserted into the model. The wax will flow around the teeth of the saw and afford a retention by means of which the model can easily be handled. A hollow sprue, made from a hypodermic needle, may then be placed over the saw, the saw is removed, and the wax model is ready for being invested.

Dr. Henry Barnes, Cleveland, Ohio. "Pure Gold Matrix Inlay, Using Ney's Soft Foil and Sweating 22-Karat Gold Plate, Without Investment."

A piece of Ney's or some other semi-cohesive gold is rolled into a ball, pressed into the cavity, and molded to place with a suitably pointed orange-wood stick. When the proper form is obtained, the gold is removed from the cavity, placed on a charcoal block, and without painting, investing, or fluxing, 22-karat gold plate is sweated into the mass, care being taken to place the gold in the center of the inlay. This is continued until the mass is solid. Next a mat of semi-cohesive gold is placed on the cavity side of the inlay, the inlay placed in the cavity, and malleted to place. The surplus margin of gold is then turned over upon the inlay and burnished to place. The inlay is removed from the cavity, placed upon the charcoal block, and again sweated, after which little finishing will be necessary. This method is also applicable to the making of crowns, bridges, etc.

Dr. J. M. Crosby, Bradford, Pa. (I.) "Cast Anchorage for Anterior Teeth." (II.) "Restoration of a Fractured Root."

(I.) The following method of bridging anterior teeth, without displaying any gold and without destroying the pulps of the teeth to which the bridge is attached, has been very helpful to the clinician: Sufficient enamel is removed from the lingual surfaces of two adjoining teeth to allow the use of two plates of gold strong enough to resist attrition. Parallel holes are then drilled through the gold plate and into the teeth, and pins are fitted into the holes. The pins are then threaded to afford additional attachment for cement. The pins and plates of gold are placed in position in the mouth, and wax patterns made and trimmed to proper articulation, and cast in the usual manner. These anchorages are then placed in the mouth, the impression and bite are taken, and the bridge is finished in the usual manner.

(II.) The fractured portion of the root is removed, a cavity is drilled in the outer surface with the How anchor drill, and German silver screw wire is inserted as a handle for the fractured portion of the root. This is then oiled and invested in plaster, in order to obtain an impression of the fractured portion of the tooth. This is then removed, and Tenax wax molded into the plaster impression, trimmed to proper contour, removed, and cast. This casting is placed in the mouth, the crown post inserted and waxed to the inlay made, after which the whole is removed, invested, and soldered. The case can then be treated like a Richmond crown, or a half-band for the lingual surface of the root can be cast to the crown post and inlay restoration.

ORTHODONTIA.

Dr. J. H. McClure, Wheeling, W. Va. "Regulating Appliance."

This clinic consisted in the demonstration of a device for moving into proper position one of the six upper anterior teeth which may occlude inside of the lower arch. This appliance consists of a band fitted around the tooth to be moved, to which a gold strap is soldered. A short piece of watch-spring or clasp metal is then placed through the strap of gold, the ends resisting on the adjoining teeth, thereby exerting traction on the tooth to be moved. If a single piece of watch-spring does not afford sufficient force, several layers of it may be used. The points of advantage claimed for this device are (1) its simplicity and (2) absolute freedom from any inconvenience to the patient.

Dr. M. F. Finley, Washington, D. C. "Orthodontia Models."

This clinic consisted in the exhibit of a number of models of cases which had been treated according to the Jackson system. Dr. Finley showed a case of distal occlusion which had been caused by the non-eruption of the four first bicuspids, and an X ray showing the absence of the germs of these teeth. The occlusion was corrected by means of a plate with an inclined plane. The clinician also showed an X ray of a central incisor which had been fractured in the alveolar socket.

Dr. V. H. Jackson, New York. "Orthodontia."

Dr. Jackson demonstrated his method of equalizing the dental arches, and describing the action of the apparatus used for this purpose, which could be easily removed from the mouth by the patient. The clinician also showed a number of models with appliances in position showing his method of expansion and contraction of the dental arches.

Dr. Jackson also demonstrated the use of the tracing-card, by means of which he could accurately record the measurements and regulate the appliance so as to obtain any amount of force desired.

ORAL SURGERY, TREATMENT OF PYORRHEA ALVEOLARIS, ORAL PROPHYLAXIS, ETC.

Dr. C. P. **Wood**, Detroit, Mich. "Treatment of Pyorrhea; Exhibiting Cases Cured."

This clinic consisted in the treatment of a case of pyorrhea and the exhibition of a case which had been completed, showing the clinician's method of retaining loosened teeth by means of bridges and splints. The clinician claimed that he had not met with a case of pyorrhea which could not be cured entirely by local means, provided that the unattached surfaces could be kept clean and the roots of loosened teeth made firm in their sockets by means of bridges or splints.

Dr. J. O. **McCall**, Buffalo, N. Y. "Oral Prophylaxis and Pyorrhea."

Dr. McCall demonstrated the removal of visible deposits with ordinary scalers, following this operation by going under the gum margin and into the pockets, and scaling and polishing the teeth with the Carr pyorrhea instruments. The clinician also demonstrated his method of practicing oral prophylaxis, which consisted in the removal of deposits from the teeth, the grinding off of rough portions of teeth and fillings, after which the teeth were highly polished by means of strips, wood points, and engine polishers, and the patient was instructed in the care of the mouth.

Dr. M. A. **Kendrick**, Port Huron, Mich. "The Use of Dental Splints in Pyorrhea Cases."

This clinic consisted in the demonstration of the use of a splint for holding loosened teeth firmly in cases of pyorrhea alveolaris. The clinician suggested that by the use of such a splint as described below, two loosened teeth may be held firmly by fastening them to one firm tooth by means of the splint. The attachments for the splint are, for instance, in the case of a lower canine, the lateral and the central incisor: For the canine, an inlay with a pin in the root-canal; for the lateral incisor, an inlay with pins on each side of the pulp to strengthen the attachment; for the central incisor, a Carmichael crown reinforced with a short pin in the root-canal. These three attachments are then joined together in the form of a splint.

Dr. J. H. **Hood**, Oil City, Pa. "Mechanical Treatment for Pyorrhea Alveolaris, with the Carr Instruments."

This clinic consisted in the demonstration of the clinician's method of instrumentation and treatment of teeth in cases of pyorrhea alveolaris. The instrumentation was done with the Carr instruments. After instrumentation, the teeth are thoroughly polished with flour of pumice and phénol sodique with the aid of a prophylactic polisher, followed by the use of Cutter's silk tape, moistened with the pumice and phénol sodique; for the final polish, silex is used. The pus pockets are then thoroughly washed out with warm water and treated with phenol-sulfonic acid. Before the acid is used, however, the clinician recommends the use of shellac on the necks of the teeth to prevent the sensitive condition which results from the use of the acid.

Dr. W. J. **Charters**, Des Moines, Iowa. "Pyorrhea, Using Good's Selection of Younger's Instruments."

The clinician claimed that it was necessary in the treatment of pyorrhea to remove first all deposits, and then to remove a portion of the alveolar process because of the liability of a small amount of deposit being present on the alveolar surfaces. After such instrumentation the pus pockets are thoroughly syringed with lactic acid, and all loosened teeth are ligated.

Dr. W. O. **Campbell**, St. Louis, Mo. "Fountain Tooth-brush."

Dr. Campbell showed an arrangement for the proper cleansing of the teeth, which consisted of a tooth-brush with perforations in the back. A tube connecting the brush with an antiseptic container conveys the antiseptic to the body of the brush, and by means of the openings in the back of the brush the fluid is delivered at the base of the bristles, whence by capillary attraction it is drawn to their points and is thus conveyed to the teeth and gums. The clinician recommended the use of this device as an aid in the treatment of pyorrhea, because the antiseptic is deposited where it is most needed. He also claimed that it was an efficient means of maintaining oral hygiene, furnishing a bountiful supply of cleansing fluid.

Dr. J. H. KELSEY, Erie, Pa. "Oral Prophylactic Treatment."

This clinic consisted in the demonstration of the clinician's method of monthly treatment in prophylactic work, as follows: The operator's hands are thoroughly cleansed and rendered sterile by sprinkling on them pure alcohol to which has been added a sufficient amount of some aromatic toilet water to counteract the odor of the alcohol. The work is done entirely by hand, the dental engine being used in this treatment only for the purpose of removing and polishing rough edges of fillings. All solid deposits and bacterial accumulations are removed by instrumentation. All the surfaces of the teeth, particularly the necks, are thoroughly polished with flour of pumice and phénol sodique carried on orange-wood sticks and points of suitable sizes. Porte-polishers of different angles are used to hold the orange-wood points. All stains and plaques are removed, and the entire oral cavity is rendered sterile in every respect. Various medicines and sprays were used and described. The clinician also called attention to the fact that oral prophylaxis consists not only in the monthly treatments as described above, but also in the restoration of the contact points between teeth and bridge work constructed with mechanical correctness and on hygienic principles. The clinician also called attention to the necessity of instructing the patient in the home treatment of the mouth and teeth, and showed a number of tooth-brushes of various forms, suggesting the shapes he considered most efficient.

Dr. GILLETTE HAYDEN, Columbus, Ohio. "Pyorrhea Cases."

This clinic consisted in the exhibition of two cases of pyorrhea which had been treated two years previously, and which were maintained in a healthy state by means of prophylactic treatment.

Dr. ALICE M. STEEVES, Boston, Mass. "Oral Hygiene."

Dr. Steeves exhibited a number of models showing a common condition of the mouths of children who were compelled to live in congested districts of large cities. These conditions are not confined to any particular race, but demonstrate the very great importance of educating both the profession and the laity to the necessity of meeting these conditions, and also the importance of systematizing the efforts of the profession as well as the laity to overcome them. She suggested that a uniform law making it compulsory that these mouths should be kept in proper condition, like the law which compels all children to attend school, would be a means to this end. In a large majority of these cases, as she claimed, the neglect of the mouth is not entirely due to the poverty of the people, but as much to their shiftlessness and ignorance. Dr. Steeves recommended the teaching of this subject in the schools, and suggested the establishment of dental clinics in connection therewith; these, if properly conducted, could be made self-supporting. Free dentistry as a wholesale commodity, she claimed, is impossible, and the difficulty would have to be met in another way. At the present time, with the number of cases of malnutrition caused by unhygienic conditions, together with overwork in school and out of school, a generation of weaklings is produced, and unless decisive steps are taken in the right direction to combat these conditions, the next generation will be considerably below par physically.

Dr. I. N. CARR, Durham, N. C. "Chronic Abscesses."

This clinic consisted in the treatment of chronic abscesses of the anterior teeth by extracting the teeth, then amputating the root to a point as far as the pericementum had been destroyed, after which the teeth are replanted and held in position by means of a splint cemented to the adjoining teeth.

Dr. A. E. Smith, Pittsburg, Kans. "Prolonged Anesthesia Produced by Nitrous Oxid and Oxygen."

This clinic consisted in the administration of nitrous oxid and oxygen to three patients, as follows: (1) To a patient for the preparation of a hypersensitive cavity for a gold filling; duration of anesthesia between twenty and thirty minutes. (2) Removal of a pulp; duration of anesthesia five minutes. (3) Removal of a pulp and the preparation of a cavity; duration of anesthesia fifteen minutes. During the administration of the anesthetic the clinician explained the different stages of anesthesia, its duration, dangers, symptoms, the efficiency of its use in operative dentistry and surgical operations, also the proper technique and office management of patients.

Dr. W. H. DeFord, Des Moines, Iowa. "Anesthetic Inhaler."

Dr. DeFord demonstrated the use of the Stark anesthetic inhaler, showing its uses for somnoform alone and in sequence with ether and chloroform, for cavity preparation, removal of pulps, shaping of the crowns of vital teeth for crowning, and for general surgical purposes.

Dr. Joseph Tichy, Chicago, Ill. "Treatment of Putrescent Pulp-canals with Sodium and Potassium."

This clinic consisted in the demonstration of the treatment of putrescent pulp-canals by the use of sodium and potassium in connection with tricresol and formalin.

The first step in this treatment consists in removing all putrescent odors by the use of tricresol and formalin. The decomposed matter which remains in the canals can then be readily removed by the action of sodium and potassium, which converts the decomposed matter of the canals into soap. This can then be readily removed by syringing the canals with warm water. Dr. Rhein recommends a further sterilization of the canal with a 1:500 solution of mercury bichlorid in a 3 per cent. solution of hydrogen dioxid. Thus it will be seen that the contents of the canal are chemically changed and physically removed, leaving the canal as white and clean as though it had been scrubbed with a brush.

Sodium and potassium has a great affinity for moisture, and should be used with care about the patient's mouth. The few minute particles of the sodium and potassium which will cling to the point of a platinum broach are sufficient to be worked into the canal at one time. This should be repeated again and again, until a suds-like appearance is noticed; then it should be carefully washed out with hot water. Care should be taken not to force any of the contents through the apical foramen, as it may cause pericemental inflammation.

Following this, the canals should be thoroughly dried with warm air, and, making use of capillary attraction, a saturated solution of hydronaphthol and alcohol introduced, this part of the operation requiring from ten to fifteen minutes. The root-canals are then dried out and filled permanently.

Dr. D. H. Young, Attica, N. Y. "The Treatment of Dental Abscesses by Atmospheric Pressure."

This method is simple, scientific, and efficient for treating a dental abscess at any stage.

The end of the abscess-pump makes an airtight union with an opening in the tooth which communicates with the pulp chamber and root-canals. After this connection is made, if the case in hand is one of incipient abscess, the plunger of the abscess-pump is moved so as to create a vacuum in the tooth. This will cause the putrescent matter at the ends of the roots to flow back into the tooth whence it came, and when this, the cause of the abscess, is removed, nature will promptly start the healing process.

In the case of fistulous abscess the plunger is moved so as to force the contents out through the fistula.

Dr. E. F. Loeffler, Ann Arbor, Mich. "A Practical Demonstration of the Use of the Ether Spray for Desensitizing Hypersensitive Dentin."

The prevention or the relief of pain is recognized by many prominent dentists as one of the most important questions before the profession today. The clinician's experience in the use of the ether spray for obtunding hypersensitive dentin, both in private practice and in college clinics, has been very satisfactory and has extended over a period of more than three years. By this method the most sensitive teeth can be excavated, ground down for crowning, the pulp exposed and even extirpated without any pain to the patient. The ether spray is in his opinion by far the most reliable and practical agent for the prevention of pain in nearly all operations upon the teeth. The action of the ether upon the pulp tissue is purely physical, consisting in a lowering of the temperature, but not to the extent of producing harm. The secret of success in the use of this agent depends to a great degree upon the careful manipulation of the spray with a suitable apparatus by which the effect of the ether is produced gradually. The clinician claimed that in no instance has any injury from the use of the ether spray in dental pulps been noted.

Dr. Charles E. Smith, Akron, Ohio. "Excavating Sensitive Cavities, Using Nitrous Oxid and Oxygen."

In the case demonstrated, analgesia was produced in about one minute, and maintained for half an hour, during which time two cavities in the anterior teeth were prepared for filling.

Dr. J. P. Henahan, Cleveland, Ohio. "Nitrous Oxid and Oxygen for Extracting."

This clinic consisted in the administration of nitrous oxid and oxygen, by means of the nasal inhaler, to quite a number of patients in whom various numbers of teeth were extracted. During the administration the clinician explained his method of technique in administering, and also the proportion of nitrous oxid and oxygen to be administered under varying conditions.

Dr. C. K. Teter and Dr. J. H. Lenker, Cleveland. "Prolonged Anesthesia with Nitrous Oxid and Oxygen Administered Through the Nose for the Removal of Tonsils and Adenoids."

This clinic consisted in the administration of nitrous oxid and oxygen through the nasal inhaler in eight cases for the enucleation of tonsils and the removal of adenoids. The gases were administered in a warm state and under pressure, and the anesthesia was maintained during the entire operation in each case.

Dr. E. S. Braithwaite, Chicago, Ohio. "The Mechanical and Surgical Treatment of Congenital Cleft Palate, Demonstrated with Models."

The clinician stated that the object of his clinic was to demonstrate by means of models the desirability of surgical treatment for the relief of congenital cleft palate in preference to attempts at relief by mechanical means. He gave as the reasons for this conclusion the following: (1) By surgical treatment normal conditions are restored. (2) Irritation from a mechanical appliance, which may cause inflammation, is eradicated. (3) The closing of the Eustachian tubes caused by the atrophied palatal muscles from nonuse is avoided. (4) Affection of the hearing is eliminated. (5) Relief from fatigue caused by an abnormal strain from continued speech, also (6) from the constant annoyance caused by the continual presence of a mechanical appliance is obtained. The clinician showed models of a case which had been under treatment by mechanical means during some fifteen years, and which was then operated upon, the patient being dismissed from the hospital within twelve days, in a perfectly healthy state.

Dr. H. J. Kauffer, New York, N. Y. "Method of Promoting More Favorable Prognostications for Staphylorrhaphy by the Use of Hyperemia, Induced by Suction Plates."

The plate is made in two parts, the

upper being a piece of silver plate made to rest on the floor of the nose, and held in place by wires extending from it through the cleft, across the roof of the mouth and attached to the teeth. It is lined with soft rubber, and when in place seals the nasal cleft. The lower part is a silver plate which covers the entire roof of the mouth; this is also lined with soft rubber, and held in place by clasps which are attached to the teeth best adapted to support the apparatus. All edges of the cleft must be covered, but great care should be taken not to bring pressure to bear on any of the soft tissue. The space between the two plates represents the cleft, and in the act of swallowing, suction is produced in this chamber, the patient being instructed to assist this by sucking, and in this way hyperemia is induced. Every dentist has noticed how healthy hyperemic tissue fills the air-chamber of an artificial denture. The same principle on a large scale applies to this appliance. The clinician does not promise to approximate the edges of a cleft by this method, but the hyperemia increases the vascularity of the tissue, which is an important factor in cleft-palate operations, as the large percentage of failures are due to poorly nourished tissue.

The splints are cast aluminum cap splints, which extend down over one-half of the body of the tooth and are held in place by cement and wires passed around he neck of a tooth and laced up over the splint from one tooth to the other.

Dr. Alfred Hall, Chicago, Ill. "Extraction with Reference to Special Points of Instrumentation."

The clinician demonstrated by means of models his method of removing imacted lower third molars with the smallst amount of laceration to the tissues. This assures the speedy recovery of the patient, because only a small area is disurbed, and the tissues surrounding the eeth are properly removed, thereby lessening the liability to inflammation and swelling. Cards mounted with natural teeth were shown, illustrating the abnormal formations met with in third molars. These abnormal formations cause considerable difficulty in the removal of these teeth, and result at times in conditions for which the operator is not to be blamed.

Dr. W. A. Buscho, Chicago, Ill. "Pyorrhea."

Dr. Buscho showed a patient suffering from pyorrhea, in whose mouth all the teeth had been previously treated with the exception of two, which were left to show the original condition, and which were treated at his clinic. The treatment consisted in instrumentation and polishing of the teeth, washing out the pockets with sterile water and massaging the gums.

Dr. T. E. Turner, St. Louis, Mo. "A Combination Bridge and Drainage Tube for the Maxillary Sinus."

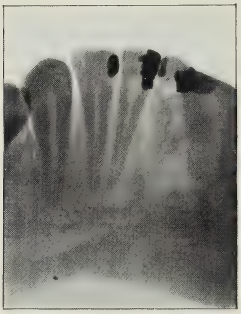
Dr. Turner demonstrated his method of procedure in a patient suffering from empyema of the antrum. The patient had for several years been under the treatment of a rhinologist, who had decided that it was necessary to provide permanent drainage. The first molar on the affected side was extracted, and the antrum was opened through the alveolus, and a platinum tube inserted. Inlays were then made for the distal surface of the second bicuspid and the mesial surface of the second molar. With the inlays in position, an impression was taken, and a molar crown was carved in wax around the platinum tube and cast to the tube, after which the inlays and the tube were soldered together. A plug or plunger was then made to fit the tube, and a slot was cut in the cast crown between the buccal cusps to prevent the plug from going into the tube too far. A slot was then cut in the side of the plug, and an iridio-platinum spring inserted to hold the plug in its proper position. The platinum tube was then cut just short of the floor of the antrum, and the appliance cemented to place in the mouth. The antrum could then be irrigated whenever necessary, by simply removing the plug from the platinum tube.

Dr. E. **Ballard Lodge**, Cleveland, Ohio. "The Amputation of the Apical Root End as Treatment in Chronic Alveolar Abscess; Aided by Skiagraphs Made at Same Sitting."

The patient, a young lady of twenty, presented with a chronic dento-alveolar abscess of the lower right central incisor. A fistula was present which had been discharging pus externally for the past seven months. The fistula had opened through the integument beneath the chin, and about one inch posteriorly thereto. A skiagraph taken prior to the operation showed a considerable area of bone resorption about the apex of the root of the lower right central incisor; it also revealed an unsuspected blind abscess at the apex of the left central incisor. This, however, was seen to be entirely independent, and was treated accordingly. The skiagraph also showed that the root of the right central incisor had not been filled, and that it deviated distally to close approximation with the right lateral incisor. The skiagraph further showed that the fistula did not pass through the mandible, but that it had progressed in the line of least resistance to the soft tissues, and favored by gravity. The root apex being situated below the attachment of the genio-hyoid muscle, the pus had found an exit through the skin below the chin.

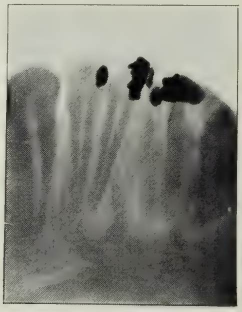
Operation. Careful prophylactic treatment having been instituted at a previous sitting, the case was ready for surgical treatment. Tincture of iodin was painted over the gum for the sterilization of the part prior to the introduction of the hypodermic needle. Local anesthesia was produced by the injection of about fifteen drops of a one per cent. solution of cocain hydrochlorid and adrenalin chlorid. This was freshly prepared by dropping two one-sixth grain pellets of cocain which contained one three-hundredth of a grain each of adrenalin into thirty-four drops of distilled water, the quantity of the alkaloid injected not exceeding one-sixth of a grain.

Fig. 1.



Before operation.

Fig. 2.



After operation.

When the part was well anesthetized, an incision was made with a lancet over the apical third of the root, being careful to avoid the frenum labii, and cutting freely to the bone. Another incision was then made, bisecting the first in the form of the letter X. The tissues were then pressed apart to admit a bur, and a No. 2 Schamberg bone-bur, driven by the engine, was passed between the central and lateral, and the root excised. The root was found to be smoothly dressed, and the excised portion was removed with a Watling spoon excavator. The necrosed sinus walls were then carefully curetted with the same instrument, and the cavity irrigated with hydrogen dioxid to remove all root-cuttings, as well as pus and other débris.

The operation on the bone was then temporarily abandoned, and the abscess below the chin was opened. Gentle pressure was then applied to the parts, causing the evacuation of a considerable amount of pus. Hydrogen dioxid was then forced through the fistula by applying a Sub-Q syringe to that portion of the bone cavity where the excision and curetment had been applied, and a slight evidence of its traversing the fistula was manifest under the chin.

Both wounds were then dressed. The cavity in the bone was packed with a small pledget of iodoform gauze, and the wound on the skin dressed simply with a little aseptic gauze held in place by adhesive tape. The patient was afterward seen daily for a week, during which time recovery was rapid and without incident.

This operation was attended with very little pain, as the patient stated at its completion. The results in an operation of this kind are so satisfactory that the clinician recommended it as a procedure of which dentists should avail themselves more often than is the case at the present time. When the root-canals can be well dried, it is just as well to fill them before the excision of the root. In the case cited above, however, the root was filled after the excision.

The clinician mentioned the fact that the skiagraph in cases of this kind is a very valuable aid, as it gives definite information concerning the extent of the resorption of the bone or root or both, and shows whether apical amputation is indicated.

PORCELAIN.

Dr. C. E. Woodbury, Council Bluffs, Iowa. "Porcelain Inlay."

Owing to the fact that a suitable patient was not obtainable, an inlay was not made for a practical case. A table clinic was given, however, showing the mixing and manipulation of Lennox stains for use in altering the shades of artificial teeth and crowns. The colors used are blue black, white, yellow ocher, Venetian red, Assyrian blue, and deep sea-green. They are mixed with glycerin, the colors being blended to produce the shade desired. They are painted on with a brush in the same way as china paints, and fuse true to color, although they are of less intensity than they appear when first applied.

Dr. W. A. Capon, Philadelphia, Pa. "Porcelain Restoration of Incisal Edges."

The broken or irregular surface of the tooth is trimmed so that the enamel edge is square and true. The cavity of the tooth is made as deep as the circumstances will permit, if the pulp is alive; otherwise its depth is regulated by the operator's judgment.

The usual inlay foil is then burnished into this prepared cavity without considering the tearing of the metal at the bottom portion, because this space is occupied by a loop or staple of wire. This staple is made from 24-gage iridio-platinum wire, and inserted into the matrix while it is in position in the cavity. Porcelain in a pasty condition is then pushed into the intervening spaces and packed about the protruding ends of the wire. The excess moisture is removed with bibulous paper or a napkin, so that there will be a minimum change of the united section during the fusing of the porcelain.

This combination is then given a hard biscuit bake, reburnished into the cavity, and contoured with porcelain in the usual manner. After the final baking, the platinum foil is removed and the section cemented into position, thus restoring the tooth to a normal appearance in a practical and durable manner.

Dr. Fred J. Capon, Toronto, Canada. "Porcelain."

The clinician demonstrated the many different uses to which porcelain may be put, including the delicate inlay bicuspid and molar crowns and the continuous gum dentures. The use of the porcelain for continuous-gum work was shown in the different stages from the platinum base-plate to the time when it reached the furnace, the clinician baking a complete practical case. He also showed a sample case upon which were carved teeth and bridges, the base being made of porcelain. The principal object of this clinic was to show the importance that porcelain plays in dental operations.

Dr. Capon also demonstrated his method of making an incisal edge inlay, showing the use of pins and their means of adjustment, and claimed that it was just as important in these cases to maintain the porcelain inlay in position by means of pins or dowels as is the case in gold inlays. The clinician further showed a number of models illustrating porcelain crowns, incisor crowns, post, tube, and jacket crowns, and bicuspid and molar crowns. The bicuspid and molar crowns were of the cup variety, the porcelain being held practically in a matrix to insure strength and utility.

Dr. **Willis A. Coston**, Topeka, Kans. "Porcelain Jacket Crowns."

This clinic demonstrated the method of making porcelain jacket crowns on models made of silicate cement. The models are made under pressure in the Roach swager, which produces a perfect model for this purpose. All the lines and angles are reproduced perfectly in the cement. The model produced is very hard, and the platinum matrix may be burnished or swaged over it with little danger of breaking or crushing the model. The porcelain body may be applied while the matrix is in position on the model. The body used for this purpose is S. S. White high-fusing body, fusing at 2560° F.

Dr. Coston also demonstrated his method of adapting the S. S. White countersunk molars and bicuspids for crown and bridge work.

Dr. **Harris J. Frank**, Chicago, Ill. "Preparation, Manipulation, and Baking of a Porcelain Jacket Crown."

A natural tooth was prepared in the same way as for a gold crown, *i.e.* the entire enamel was removed, leaving the tooth slightly cone-shaped, and then the preparation furthered by cutting a small square shoulder just under the free margin of the gum, entirely around the tooth.

A matrix of 1-1000 platinum was then burnished carefully about the prepared crown of the tooth and shoulder, and the platinum locked on the lingual side with a tinner's joint, after cutting away the excess platinum below the shoulder.

With the matrix in place on the tooth, the construction of the porcelain crown was started by applying a very little porcelain at a time, thoroughly spatulating each application to eliminate all air-bubbles. This was continued until the entire matrix was covered with porcelain. A second layer of porcelain was then applied in the same manner, with the object of obtaining the desired shade, and when all was well spatulated and the porcelain dried, the crown was removed from the root and placed in a furnace. It required about twenty minutes to raise the heat of the furnace up to the fusing-point, 2560° F., when the crown was removed, the result being a beautifully translucent and lifelike tooth.

The porcelain used in this case was that of the S. S. White Dental Mfg. Co. known as the 2560° F. The crown was completed in one baking in an S. S. White furnace.

In order to demonstrate the strength of a tooth constructed in this manner, a similar crown was built on a large spike, cemented on, and driven through a block of wood four inches in thickness.

CROWN AND BRIDGE WORK.

Dr. **W. H. Moseley**, South Boston, Va. "An Ideal Bicuspid Crown, Made by Using a Porcelain Veneering Over a Gold Shell Crown."

This clinic consisted in the demonstration of a method of using an all-gold crown in the anterior portion of which a countersunk depression is made, into which low-fusing enamel is baked by means of an ordinary blowpipe.

Dr. **J. A. Heaton**, Hoopeston, Ill. "Removable Band for a Porcelain Crown."

An upper left first bicuspid is ground down to the gum line, the enamel scaled, the root trimmed, and a gold band, as in the Richmond crown, fitted to the root. The crown is then selected and shaped according to the form of the band. When the band is fitted to the crown, the portion of the crown that is to show is beveled to a depth corresponding to the thickness of the gold (32 gage). The band is then placed on the crown and tried on the prepared root. The crown is removed, dried thoroughly, and the band replaced on the crown. The crown, with the band in proper position, is then cemented into place in the mouth.

Dr. E. P. Dameron, St. Louis, Mo. "Diatoric Teeth in Crown and Bridge Work."

This clinic consisted in the demonstration of the various uses of diatoric teeth in making crowns and bridges. The clinician also demonstrated a method of casting hollow all-gold dummies.

Dr. C. W. Benson, Duluth, Minn. "Contouring Two-piece Shell Crowns."

After fitting the band to the properly prepared tooth, the contour is obtained by stretching the metal outwardly without changing the form of the root-end of the band. This is especially indicated in lower molars and bicuspids, as the normal contour, which is most pronounced on the buccal surface, is thus restored. This contour is essential, as it protects the gingiva from the excursion of food over this surface.

Dr. J. J. Travis, Plymouth, Mich. "Gold Bridge, Using the Davis Crown for Anterior and Posterior Positions."

The clinician demonstrated the use of the Davis crown in bridge work, in both anterior and posterior positions, in connection with gold and iridio-platinum.

Dr. A. O. Plant, Wheeling, W. Va. "Combination of Diatoric Tooth and Metal Casting for Restoration of Posterior Teeth."

The tooth to be crowned is trimmed, first, to the gum level, and a diatoric tooth is selected and ground to an approximate fit at the buccal margin. The tooth is then waxed to position as required, after which the casting is made either with or without the porcelain tooth in position. The crown is then finished and cemented to place in the mouth.

Dr. E. M. Carson, St. Louis, Mo. "A Cast Crown."

This clinic consisted in the demonstration of a method of making an anterior crown of the Richmond design, the crown being cast instead of soldered. The root is ground to nearly the gum margin and beveled all around with a No. 1 or No. 2 bur, and slight depressions are made at four points around the dowel opening to prevent the crown from rocking or becoming misplaced. No backing is used upon the porcelain facing, the casting being made directly upon the facing, although a backing may be used if desired. The crown is waxed to position in the patient's mouth immediately after preparation of the root, and the casting proceeded with in the ordinary manner. The clinician showed models illustrating the different steps in the making of this crown, and claimed for his method the following advantages: (1) Speed. (2) A more artistic crown. (3) A better fit is secured by casting than with the Richmond method.

Dr. G. G. Bell, Ashland, Ky. "Grinding and Mounting a Detached-Post Crown."

The enamel is removed from the root in the same way as for a shell crown. A wire measurement is made, and a conical silver tube of 28 gage, is made half the length of the tooth to be used. The tooth is then ground to within two lines of the gum margin and the tube fitted over the root. The tube is then removed, and the root beveled at the buccal margin. Next, the crown is fitted to the tube, and then beveled to correspond with the bevel of the root, after which the crown is cemented to place as in any case where one mix of cement is used.

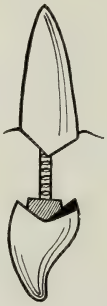
Dr. J. Gillespie Reid, Marion, N. C. "Some Casting Specialties in Crown and Bridge Work."

This clinic consisted in the demonstration of methods of casting on Logan crowns, and the use of the S. S. White combination sets in crown and bridge work, either gold or Weston's metal being used for casting.

Dr. Reid also demonstrated a method of replacing a broken facing in bridge work, as follows: If one of the six anterior teeth is broken off, the pins, if they still remain, are ground at the point of fracture. The bridge is then ground on the lingual surface sufficiently to allow for a thickness of No. 36-gage pure gold. The gold backing on the bridge is then slit to correspond with the pins in the facing sufficiently far down to allow the facing to go into position, being careful not to weaken the bridge at this point. With the facing in position, a piece of No. 36-gage pure gold is burnished over the lingual surface, down over the incisal edge of the facing, in which holes are made to admit the pins of the facing. With the facing and backing in position, an impression is taken, the piece removed and soldered, after which the crown is cemented to position. Instead of using the gold plate, the facing may be waxed to place with casting wax, removed, and cast in the usual way. The clinician claimed that this was an excellent method of bridge repair, and could be followed in the case of bicuspids as well as anterior teeth, except that in the case of bicuspids it was necessary to cast because of the fact that the pins were not sufficiently long to burnish the gold plate thereto.

Dr. Charles P. Grosby, St. Louis, Mo. "(I.) Preparation of Root for Porcelain Crowns. (II.) Cavity Preparation for Cast Inlay Abutments for Bridge Work."

(I.) The clinician showed several anterior roots, the preparation of which was so made as to eliminate the possibility of splitting them under strain, and to form strong abutments for bridge work. This may be accomplished by beveling the root both labially and lingually from a central point so that the cast base which is to form the base of the crown will straddle the exposed end, overcoming any tendency toward rotation or displacement. The labial end is to extend from the lingual edge of the root-canal to a point far beneath the gum, and the lingual bevel to extend not quite to the gum line. The basal end of the canal is enlarged to form a step as deep as is consistent with the strength of the remaining edge. A dowel of 14-gage threaded iridio-platinum wire, should be adjusted to fill the enlarged canal closely. The step in the base may be burnished with platinum foil and cast against the platinum lining, or cast directly. Care should be taken that no gold is on the dowel above the step.



(II.) The clinician demonstrated an upper right bridge mounted on an articulated form, the first bicuspid and first molar serving as inlay abutments. The success of this method of attachment depends largely upon the preparation, which consists in a flat base, from which the axial margins should be trimmed at right angles or slightly diverging toward the periphery. The preparation is made with a view to creating a self-cleansing area, and the enamel walls are well beveled. The attachments are fortified by stout threaded iridio-platinum dowels.

The clinician also demonstrated how to duplicate the natural cusps by taking an impression of the latter in modeling compound. After the softened inlay wax and dowel are in position, the impression is pressed well into place, and the exact duplicate cusps will be formed.

Dr. W. J. Boydston, Fairmont, W. Va. "Method of Making Porcelain-Faced Shell Crowns by the Use of the Steele Facings for Bicuspids."

The tooth is ground in the same manner as for a shell crown, except that the buccal surface is beveled to accommodate the facing. The band is fitted to the root and ground away at the buccal surface, leaving a narrow band at the gingival margin. The cusp is then swaged, waxed to the linguo-occlusal edge of the band, and tried to place to secure proper articulation. The cusp is then soldered and refitted. With the cusp and band in position, the facing is ground to approximate fit. Casting wax is placed on the facing, the facing pressed to place, and the piece removed, trimmed, the sprue inserted, invested, and cast. After the casting is made, the clinician suggested, a small portion of 20-karat solder flowed around the cast and band would prevent any possibility of leakage in the crown.

Dr. C. A. Priest, Marion, Ind. "Lingual or Concealed Anchorage for Anterior Bridges."

Having removed the pulps from the teeth to be used for abutments, cavities are cut on the lingual surfaces to a depth sufficient to allow for the bulk of gold to be used in an inlay abutment. Inlays are then made with posts extending into the root-canal, and extending over the gingivo-lingual portion of the teeth. This, the clinician claimed, would provide a strong concealed anchorage for anterior bridges.

Dr. C. L. Anderson, Tomah, Wis. "A Method for Easily and Accurately Overcoming the Difficulties of Adjusting Bridge Work on Converging Roots."

This clinic consisted in the demonstration of a process by which a bridge may be applied to converging roots accurately and easily, preventing any irregularity of the teeth and producing a perfect alignment and articulation. This method has been described in detail in the *Dental Brief* for June 1911.

Dr. J. E. Dowden, Fairmont, W. Va. "Esthetic Bridge Work."

This clinic consisted in the demonstration of a method of replacing upper incisors by using ordinary methods. Backings are first cast to fit the facings, allowing the backing to extend over the tip of the incisal edge. The facings and backings are then waxed to position, the facings removed, and the abutments and backings invested and soldered with 22-karat solder. The facings may then be placed in position and soldered at the pins, or they may be cemented in position. The clinician claimed that by this method the danger of fracture of the porcelain is reduced to a minimum, and any conspicuous display of gold is avoided.

Dr. S. H. McAfee, New Orleans, La. "High-Fusing Metals in the Initial Steps of Crown and Bridge Work."

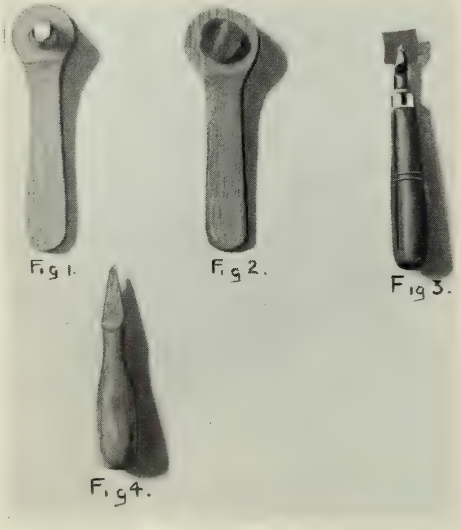
The object of this clinic was to show the use of 3/1000 inch soft platinum, 25 per cent. platinum solder, 22-karat "non-oxidizable" gold, iridio-platinum dowels, etc., in constructing copings, bands, detachable tubular backings, etc., in the first steps of crown and bridge work. The heat used for manipulating these high-fusing metals was produced by an oxyhydrogen blowpipe specially designed by the clinician.

The advantages claimed for the methods shown were greater accuracy of fit, greater precision throughout the different steps, and more positive results in the end. There is no danger of melting the copings, bands, etc., borax or flux being unnecessary, and the body of the crowns and bridges being formed by the casting process.

No originality is claimed for the oxyhydrogen blowpipe employed, except for the combination of the various parts, which insures a quick, steady, and always positive and uniform action of the blowpipe flame, whether the nitrous oxid cylinder be fully charged or nearly empty. The apparatus consists of a yoke for the nitrous oxid cylinders, to which a pressure reducer is closely connected. To this is attached that part of the Mason oxyhydrogen blowpipe which carries the needle valve, hose, and handpiece. On the gas inlet of this part another needle valve is inserted, which regulates the quantity of illuminating gas used.

The pressure gage is set to reduce the nitrous oxid; the needle valve set to give the proper amount of nitrous oxid. This is all determined by experiment. After the valves are once regulated to produce the proper flame, no further regulation is necessary except, perhaps, at long intervals. All that is necessary is to open the main supply of illuminating gas, light the flame, then open the main valve of the nitrous oxid cylinder, and at once a steady oxyhydrogen flame is obtained, no heating of the nitrous oxid cylinder head being necessary, and no regulation of the proportions of gas each time the blowpipe is used or during its use in soldering operations.

Dr. D. A. Rosenthal, Pittsburgh, Pa. “A Device for Facilitating the Perfect Adaptation of Backings and Soldering with the Least Possible Chance of Checking Facings.”



This device consists of two wooden instruments (Figs. 1 and 2) with depressions in each for the retention of a rubber cork, one of which is more flexible than the other. By placing the tooth with the pins up on the softer cork (Fig. 2) and pressing the backing into place with the other instrument (Fig. 1) the tooth is encased in a nest of gold, protecting it all around. The pins should not be bent before the tips are soldered, *i.e.* if tips are desired. The pins are run through a piece of rubber dam, and a flat, V-shaped steel instrument is inserted between them. (Fig. 3.) This instrument is pushed forward while the pins are being bent with a wooden instrument (Fig. 4), this action tending to prevent direct force being brought to bear on the porcelain, which often causes a fracture before the case is even invested.

As an additional safeguard against checking, the facings before investing are painted with a composition consisting of equal parts of powdered asbestos and prepared chalk and a small quantity of plaster of Paris.

Dr. N. W. Hiatt, Marion, Ind. “Removable Bridge.”

The clinician claimed that the removable bridge in many cases is preferable to the stationary bridge. For the making of removable bridges, he recommended the use of the Gillmore clasp as being the best he had used. The method of construction is such that the bridge can be made with either a single or double anchorage. When the double pier anchorage is used, the crowns are constructed in the same way as for any bridge abutment by means of impression and models. A clasp metal wire of No. 14 gage is then adjusted to the gum between the crowns, each end of the wire being bent and soldered to the approximal surfaces of the crowns. These extensions of the wire form a groove in the finished piece, which prevents any lateral motion. The clasp is located near the center of the bridge, and is made of clasp gold. Any material desired can be used in the construction of this bridge.

Dr. W. H. Hayden, Youngstown, Ohio. “Casting Bridges, Including Abutments, in a Single Cast.”

This operation consists of the molding of casting wax directly to the face of the abutment roots for the construction of a nine-tooth bridge. Embedded within the wax and connected with dowel posts is a bar of iridio-platinum of from

16 to 18 gage, which extends throughout the bridge and gives sufficient rigidity to permit of frequent removal and insertion. The platinum bar also is an aid in waxing the facings to place and properly carving the wax bridge ready for investment. The investment is made in the usual manner, and the bridge completed in a single cast directly against the eight facings, with no apparent shrinkage. The clinician showed a practical case in which a band and cap was first made for each root, owing to the insufficient support afforded otherwise. The advantages of this method, as claimed by the clinician, are a great saving of time, greater accuracy in adjusting the neck of the facing to the bridge, and the fact of seeing the bridge in the mouth exactly as it will be when cemented to place.

Dr. A. W. Jarman, Philadelphia, Pa. "Removable Crown and Bridge Work."

This clinic covered the subject of removable bridge work, laying particular stress upon the preparation of abutments, the use of the telescope cope, and the tube and split pin, showing the need and use of these abutments in the construction of removable bridges of different types.

The clinic included the lengthy explanation and demonstration of the proper application of the casting process to removable bridge work, and its use in making removable saddle bridges for the lower jaw.

A lengthy demonstration was also given with the aim of explaining the necessity of the blowpipe in bridge work. As there are some bridges which can be cast and others which are better when joined with solder, a knowledge of both methods is necessary to the successful bridge worker.

The three removable bridges exhibited were in a finished state, and furnished evidence of the substantial character and esthetic appearance of this high-grade bridge work. It was the particular aim of the clinician in presenting this clinic to make a plea for high-grade crown and bridge work made of the best materials and in such a manner as to give the patient as nearly a perfect restoration of the lost teeth as possible.

The advantages of removable bridges over fixed bridges are evident to anyone who has seen this work. If, however, the removable parts are not constructed in the proper manner, they will be of very little value to the patient. The removable bridge affords the patient the opportunity of keeping the mouth clean, as the removed bridge can be scrubbed with soap and water, and then replaced in the mouth. Should any little part of the bridge break, it can be repaired by the dentist without destroying the appliance or annoying the patient.

As demonstrated, every means possible is employed for making bridges strong by using gold, particularly on the masticating surface, while porcelain facings are ground and placed in such a manner as to hide the gold from view.

One lower saddle bridge was exhibited, representing a very practical means of restoring lost molars in the lower jaw when there are no teeth posterior to the bicuspids. The conditions necessary for a successful restoration are a well-defined alveolar ridge and two firm bicuspids or one firm canine and one bicuspid for abutments. These teeth as abutments simply hold the saddle in position, as the saddle portion is supported by the alveolar ridge.

The replacing of the missing central was demonstrated by a small removable bridge made by using the remaining central as abutment, placing a small rest in the gold filling in the lateral, the gold being entirely concealed by the porcelain facing. The central abutment was devitalized and a tube and split pin was inserted the entire length of the tooth; then a gold inlay was cast around the tube so as to make a tight filling.

The clinician announced that he would be pleased to answer any questions by anyone interested, regarding the construction of the work exhibited.

Dr. J. L. Kelly, Chicago, Ill. "Removable Bridges."

The attachments of this system of removable bridge consist of a holding post, a retaining tube, and a bridge tube.

The retention of the bridge is obtained by the position or relation of the holding posts to each other. The means of retention is a dovetail obtained by inclining or diverging the holding posts toward or from each other. The degree of retention is modified by the retaining tubes.

The retaining tube telescopes the holding post, and is telescoped by the bridge tube, thereby insuring accurate fit of these parts, which in some cases will be found advantageous.

The holding posts are made of round iridio-platinum wire, varying in size from 14 to 10 gage and in length from 2 to 3 mm., depending on the case. These posts are soldered to the top of copes or to a bar extension.

The retaining tubes also vary in size and take up any unnecessary play between the bridge tubes and the holding posts, making it possible to place all stress on the ridge when necessary.

The retaining tubes and bridge tubes are made in steel dies and of iridio-platinum. There are twenty sizes, the smallest made to telescope a 14-gage wire, which will fit into the canal of an incisor, and the largest ½ inch in diameter, which will fit over a large molar.

With these attachments it is possible to obtain varying degrees of retention after the bridge is completed, without weakening any part, and also to place the stress where desired, as the roots and abutments are freed from it by leaving off a part of the retaining tubes or a part of each of the bridge tubes.

In cases where pyorrhea has left but few teeth, these may be used, with lasting result, because the stress can be placed as desired.

Dr. Forry R. Getz, New York, N. Y. "Some Utilities for General Practice, with Special Reference to Removable Bridge Work and Interdental Supports."

This clinic was given to show the possibilities and advantages of removable bridge work over fixed bridges and partial plates, in its adaptation to the varied conditions that present, by the employment of modified and special forms of abutment attachments, on either perfectly sound or pyorrheal and loosened teeth. The greater cleanliness rendered possible, the additional support afforded by the saddles in extensive cases, and the absence of absolute and continued fixation of the abutment teeth are much more favorable to the continued service, life, and success of the removable bridge, which represents a nearer approach to natural conditions and natural stress upon the abutments than the conditions that go with fixed bridges in the majority of cases. One case in particular, in which severe pyorrheal conditions had been present, illustrated this feature most forcibly and convincingly, in that a removable bridge endured longer than two fixed bridges in the same mouth, and when the latter were lost the removable appliance served to carry an extension saddle, which took the place of the fixed bridge and its abutment teeth.

Practical cases, duplicates, and models of cases in the mouth were shown. There were also shown three different styles of supports for mechanically uniting, strengthening, and holding in position loosened pyorrheal teeth that have begun to rotate, elongate, or move out of position. These supports were swaged and soldered, cast and soldered, and wholly cast, the employment of either method or the three combined rendering possible a larger range of applications and greater satisfaction for both patient and operator. Models of practical cases were also shown.

PROSTHETIC DENTISTRY. ARTIFICIAL DENTURES.

Dr. G. C. Marlow, Lancaster, Wis. "New Method of Taking a Bite."

This clinic consisted in the demonstration of the use of the Holmes Modern Bite Tray for taking a bite. The principal feature of the bite tray is its value in obtaining the proper relation of the jaws to each other.

Dr. C. W. MYERS, Montpelier, Ohio. "An Elastic Banded Impression Tray."

This clinic consisted in the demonstration of a method of taking an impression of the upper jaw with the aid of an elastic band around the impression tray. The band is so applied that it prevents the plaster from pushing back on to the soft palate while taking the impression.

Dr. G. E. BISHOP, Cleveland, Ohio. "The Correct Mechanical Principles Involved in Making Clasps for Partial Plates or Removable Bridge Retention."

In the making of clasps for partial plates or removable bridge retention, the clinician emphasized the importance of having the clasp extend over the three angles of the tooth for which the clasp is made. These three angles should be the anterior lingual, the posterior lingual, and the posterior labial. The lingual angles, by comparison, are much smaller than the labial one. The extension of the clasp around the anterior lingual angle is reinforced and without any spring, while the end, extending over the posterior labial angle, is the only portion of the clasp that should have any spring in it. The extension over this posterior labial angle should come to a point just over the bulge of the angle. Clamps constructed in this fashion are easily made to fit perfectly about the natural tooth, and can be placed in position with the minimum amount of spring in the clasp itself. Less wear on the tooth is the result, and perfect retention is obtained.

Dr. E. W. MARTINDALE, Columbus, Ohio. "Cast Anchor Plate; Bauman Method."

After selecting the teeth to which the plate is to be anchored, and ascertaining that they are the proper distance apart to insure the best attachment, the teeth are prepared as for Richmond crowns, allowing the post to extend a little higher than the cap. An impression is then taken with plaster, a model made, and an iridio-platinum bar soldered to the caps. This is placed in the mouth, a second impression is taken, a model made, and waxed up as desired for either rubber attachment or for casting to the teeth, after which the case is invested, and cast by any method desired.

Dr. C. H. WOOLGAR, Clyde, Ohio. "Bridge Impression Tray for Taking a Bite and Impression Simultaneously in Plaster of Paris."

The tray consists of removable sides, one side being extended to serve as a handle. The two sides are held together by means of a bolt, and a tube fitting over the bolt holds the two sides the proper distance apart. When an impression for a bridge is to be taken, the space between the sides of the tray is filled level full with plaster of Paris, carried to the mouth, and the plaster forced over the bridge abutments, including one or more teeth beyond the abutments. The patient is then instructed to close the teeth to normal occlusion, and when the plaster has hardened the patient opens the mouth, separating one jaw from the impression. The impression is then removed, stained, and plaster poured into each side of the impression, except that on the side of the abutments some material is mixed with the plaster which will enable it to withstand the heat in soldering. The two models are fastened to the articulator at the time of pouring the models. Next the sides of the tray are removed, and with the point of a knife-blade the plaster is prized from around the end of the tube that passes through the impression; the tube is then taken out by carefully twisting it with a pair of pliers. The remainder of the impression is then removed, when the two models will be left on the articulator in perfectly normal occlusion. While any articulator can be used for this purpose, one with long arms and short bows is recommended, as it permits the operator to remove the models and impression from the articulator at the time of cutting away the impression from the models. The advantage of this method as claimed by the essayist is that it gives absolute accuracy in the construction of bridges, and is very easily fitted to the mouth.

Dr. S. C. G. Watkins, Montclair, N. J. "Technique of Various Steps in the Construction of Artificial Dentures."

The clinician demonstrated his method of making artificial dentures, as follows:

He described his method of taking impressions for full dentures by first taking the impression with wax, then pressing away or cutting out the wax so as to leave some space. Then plaster is placed into the wax impression, which makes a good impression cup, the plaster is carried to the mouth and pressed home firmly. The wax impression cup forces the plaster directly against the tissues, so that a perfect impression results.

The impression for a partial denture is first taken with wax in the same way as for a full set; the wax impression is removed, and the wax in the wax impression cut away from around the teeth. Then a strip of pink base-plate wax is cut, placed in warm water to soften it, molded carefully around all remaining teeth in the mouth, and the patient is warned to keep the mouth open so as not to distort the base-plate wax. Plaster is then mixed quite soft, poured into the wax impression, and carried home firmly in the mouth. When it is thoroughly hard it can be removed by giving it a little motion and breaking the connection between the wax and the teeth. The wax will give sufficiently to allow the impression to come away without being broken to pieces. The result is a perfect impression of the roof of the mouth, and any disfigurement or distortion around the teeth can easily be remedied by carving the teeth. The plaster model is then cast, and when hard is trimmed thoroughly. The model will be scraped all over so as to allow for a thickness of tin foil. Wherever there is any soft tissue in the roof of the mouth, the model is scraped very heavily, making a deep groove across the back of the model, also around the sides of the roof of the mouth, just outside of where an air-chamber would be placed if one were to be used, bearing in mind that the rugæ are not scraped away, although scraping is applied between the rugæ. When there is any very hard bony portion in the mouth, it is not to be scraped away, but in such cases, where this tissue is extremely hard, one, two, three, or four thicknesses of No. 60 tin foil are placed over it so as to secure relief. The purpose of scraping is that when the plate is made, it will press very hard upon all soft parts, forcing the soft tissue against the bone, with the result that the plate will have an exact and solid bearing upon every portion, without any rocking or wabbling, and a perfect suction.

After the model is scraped the entire model is covered with No. 60 tin foil, which is burnished into all uneven places. The model is covered with fairly stiff shellac varnish, and before this is dry the tin foil is placed on and burnished to the model so that it is fairly a part of the latter, fitting so closely that it really adds very little thickness to it. The base-plate is then applied and stiffened with iron wire, which is run around the ridge, and in two or three places across the plate, so that the articulation can be taken without warping or distorting the base-plate at all. When the articulation is taken, the base-plate can be placed back upon the model, which it will fit perfectly.

The teeth are then selected in regard to color, shape, and general conformity to the features, contour, and complexion of the face, always bearing in mind that in the natural mouth the teeth are not all of the same shade. It is therefore necessary to choose teeth from more than one set. The clinician in making a denture rarely, if ever, uses only one set, but selects teeth from two, three, or four sets, in order to secure the proper expression and to impart to the patient's face when laughing and showing his teeth an absolutely natural appearance without any suspicion of his wearing an artificial denture. In cases where the natural teeth have been irregular, the artificial teeth should not be set up regularly, but with a slight suggestion of their original irregularity. In pyorrheal patients the teeth have a straggling appearance. When such a patient finally requires a plate, the teeth should be so arranged that they do not change the patient's face, but give a faint suggestion of the trouble which existed, so that the patient makes the impression of having had the teeth treated and improved.

When the teeth are all set up in the right position, oxyphosphate cement should be placed between them to prevent the rubber from invading the interproximal spaces, in this way preserving for each tooth its own individuality. All of the palatal surface of the base-plate is then removed with a wax spoon by simply cutting it just inside the teeth, and in its stead a single sheet of pink base-plate wax, softened in warm water, is molded to the roof of the mouth and sealed with wax to the teeth, thus making a completely new base-plate over the roof, bringing out all the rugæ in their natural form and reproducing the roof of the mouth as naturally as possible. Tin foil No. 60 is then placed over the lingual surface of the base-plate, burnished down well, and simply by a little warming fastened to the wax thoroughly. This tin foil is then trimmed all around, leaving the edge standing up about an eighth of an inch above the teeth. The edge is then cut with the scissors and bent over, so that when the plaster is poured on, the tin foil on the model will be held by the plaster to the lower half of the flask, while the tin foil on the lingual surface will be held by the plaster on the upper half of the flask. Thus, when the flask is separated, there will be a tin-foil covering on both the die and counter-die, so that when the flask is pressed together the rubber will be pressed between two tin dies, with the result that the plate will be very much denser than if it were made between plaster dies. After vulcanizing, the tin foil can be peeled off, leaving the plate perfectly polished on both sides. After trimming the rubber around the edge without any filing or scraping over the surface, the plate is finished by simply buffing it. The plate will then be of uniform thickness all over, very strong and dense, with a polished surface to come in contact with the roof of the mouth. This plate will not absorb secretions nearly as much as a plate made on plaster; it will cure what is known as "rubber sore mouth," owing to the fact that it is dense, close fitting, and does not absorb secretions which will decompose. Such a plate feels to the tongue almost like the natural tissues.

Dr. E. C. Hoffman, Plainfield, Ill. "Cast Reinforcements for Supporting and Retaining Artificial Dentures."

The clinician presented a method of supporting and retaining artificial dentures by leaving one or more teeth in place and taking advantage of their contour, the angle in which they are set, and by perfect adaptation. A casting is made to fit over and around one or more of these teeth.

The first case shown was that of a mandibular ridge with all the teeth removed except the right and left second molars.

After the impression has been taken and the model prepared, a small wax plate is made to fit over and around the contour of the tooth, allowing it to extend posteriorly over the ridge and anteriorly about one-half an inch, leaving the crown of the tooth exposed. This is invested and cast, then the cast plate is placed over the natural tooth in the mouth, and fitted perfectly. Then a small casting is made to fit the mesial surface of the right molar, allowing this to extend one-half inch anteriorly over the ridge. These castings are placed on the model and finished by the usual method, and, when completed, the plate will be held in place, and can be taken out only in one way, namely, by lifting the casting over the left molar, which may be first crowned if the operator should so desire.

The second case showed the same method applied when all teeth are removed except the lower right second molar and lower left canine. This casting is made to extend from the mesial surface of the second molar, also anteriorly along the ridge and around the lower left canine, covering the contour of the mesio-distal and lingual surface, cutting away labially.

The third case showed the mandibular ridge with only the lower left canine and first bicuspid remaining. In this case a casting is first made to fit perfectly around the mesial surface of the canine and the distal surface of the first bicuspid, covering the lingual surfaces of both teeth and the adjoining ridge, cutting away labially. This is placed on the model, and the plate made of rubber, and although it is a partial plate, it will be found to be as strong as a full denture, and will have retaining features that will hold the plate in place better than clasps and with less wear on the teeth. The same principle may be applied in any part of the mouth where one or more teeth are left for retention. Castings may be made of Weston's metal, aluminum, or gold.

MISCELLANEOUS CLINICS.

Dr. W. H. WHITSLAR, Cleveland, Ohio. "Chirognomy Exhibit."

This clinic consisted in an exhibit of silhouettes of the hands of many dentists, some deceased, including Prof. W. D. Miller, Prof. Jonathan Taft, Dr. W. H. Morgan, Dr. A. W. Harlan, Dr. E. W. Branigan, Dr. W. C. Barrett, and others. The exhibit was intended for historical purposes principally, but some scientific value may accrue therefrom later.

Dr. L. E. CUSTER, Dayton, Ohio. "New Laboratory Appliances."

Dr. Custer exhibited a novel electrical device in the form of an automatic blowpipe. The gas is first ignited by a small arc, which is obtained from the switch, which starts a little electric motor used for compressing the air for the blowpipe. A Vernon rotary air-compressor furnishes the compressed air. The blowpipe hangs upon a hook when not in use, and when the blowpipe is removed from this hook, the motor is automatically started by a switch device operated by the hook.

Dr. GUSTAVUS NORTH, Cedar Rapids, Iowa. "Table Talk on Temperaments."

Temperaments are individual peculiarities of mental and physical structure; they are the index to the peculiarities of the individual, as the tongue is the index to the physical condition of the system.

Classification of the basal temperaments by the complexion is a strongly marked distinction, especially with the nervous and bilious. The color of the hair and eyes are sometimes confusing in some temperaments.

There are four basal and twelve or more dual or mixed temperaments. Most persons represent two or more temperaments.

Nervous temperament. Body slender, generally well formed; characterized by predominance of the nervous element; complexion light, muscles small and yielding, nervous and excitable, hair and eyes either light or dark. Teeth are pearl blue or gray in color, long and considerably narrower at the neck than at the cutting edge, with long bite. The occlusion is close and firm.

In illness the symptoms are mostly complicated with those of nervous disorder, there is a want of power and endurance; the pulse is generally firm, but more rapid than in other basal temperaments. General and oral diseases are less favorably responsive to treatment than in some other temperaments.

Bilious temperament. Person is spare, angular development characterized by a preponderance of bile; dark complexion, dark hair and eyes, lips purple; teeth of a yellowish color, long and rather narrow at the neck and shapely; occlusion close.

In persons of this temperament there is a tendency to biliary and digestive derangements. In illness the recuperative power is fair, the circulation is generally good with a strong pulse. This class of persons, as a rule, is susceptible to general and oral treatment.

Sanguine temperament. Person is generally well developed; complexion fair, hair light brown, eyes blue or gray, lips red; teeth cream color, average in size, about the same width at the neck as at the cutting edge, nicely formed, with rounded cusps, occlusion only moderately firm; the jaw inclines to rotate in masticating.

Diseases often take on an acute form; the tendency is to lung and heart trouble; general and oral diseases generally respond favorably to treatment.

Lymphatic temperament. Person is bulky in development, with looseness of tissue and structure, tendency to feebleness; complexion pallid; hair and eyes either light or dark, hair thin and straight and of a soft matted nature; clear mind; circulation feeble, pulse weak; teeth are dark, clouded in appearance, large and broad with thick rounded cusps; the occlusion is loose and flat; the jaw inclines to rotate in masticating.

The recuperative power is deficient, with a tendency to scrofula and chronic affections; general and oral diseases are not as favorable to treatment as in other temperaments.

The subject of temperaments presents itself to the clinician's mind as one of great importance. Very little has been written on the subject; it is generally conceived to be a difficult study, but such is not the case—it is easy to comprehend, and one can readily be taught to familiarize himself with the distinguishing characteristics.

Dr. J. B. Sebastian, Baltimore, Md. "Phenakit Cement."

This clinic consisted of a practical demonstration of the use of Phenakit silicate cement, showing the ease with which it is manipulated, its non-injurious qualities, translucency, and adhesiveness. The clinician claimed that steel instruments used in inserting this cement into cavities did not discolor the fillings.

Dr. G. M. Holden, Hackettstown, N. J. "An Aseptic Hair Protector for Inclosing Ladies' Hair During Dental Operations."

The protector shown by the clinician was made of a fine durable material which had been previously sterilized and preserved in a sealed envelope. The protector consists of a circular piece of lawn, hemmed at the periphery, with two buttonholes worked in it. Tape is passed through the hem, and the ends are allowed to extend from the buttonholes. The protector is applied by drawing each end of the tape until the protector is of about the size suitable for inclosing the front hair, when the front is placed in position and the edges are brought above the ears and under the back hair. Both ends of the tape are then drawn firmly and tied in a bow at the back of the neck. The protector is adjusted when the patient takes the chair, and is removed immediately before she leaves it. It is then folded and placed in an envelope, with the patient's name on it, and kept for that patient's exclusive use until the series of appointments is finished, when it is laundered.

By the use of this protector the hair is properly confined and out of the way of the operator; combs and pins are held in place, and hairdressing in the office becomes unnecessary. The object of this device is to further cleanliness, save female patients all inconvenience and discomfort during and after the operation, and spare time and annoyance to the operator.

Dr. Maurice Albrecht, Indianapolis, Ind. "Originality in Dental Instruments, Mixing Cements, etc."

This clinic consisted in a demonstration of the use of the following instruments:

(1) A glass spatula for mixing dental cements. The virtue of this instrument lies in the fact that it neither adds to nor detracts anything from the mix of cement, thereby insuring an absolutely pure mixture.

(2) Glass packers. These instruments are used in the introduction of silicate or other cement into the cavity, and are ideal for manipulating this material.

(3) Common-sense gold pluggers, with shank points only three-quarters of an inch in length, as against the two and one-quarter inches in length of the conventional instruments. The handles are covered with rubber tubing, which permits a firmer hold on the instrument and thereby considerably reduces the muscular effort. There are two sets of these instruments, one for foils and one for crystal gold.

(4) A mallet covered with four thicknesses of rubber dam. The addition of the rubber renders the blow equally efficient, more elastic, less jarring, and less dangerous.

(5) A double-end pin-setter, one end being straight, the other bent at a right angle. The latter is used in pressing home the retaining posts employed in root-canals.

Dr. L. J. Walker, Crafton, W. Va. "Advantages of Ambidextrous Operating."

The clinician demonstrated, by operating with equal dexterity with either hand, how readily an operation which is difficult to perform, for example with the right hand, becomes greatly simplified when done with the left, because the field is more favorably situated for a left-hand operation, and *vice versa.* He emphasized the following reasons why dental surgeons should train both hands:

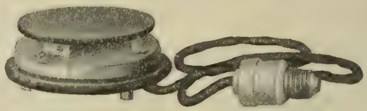
(1) It is a great deal better to overcome the obstacle of an untrained hand once for all than to contend daily throughout years with the obstacles that pertain to at least one-third of all operations for a one-handed operator.

(2) No dentist has the right to claim extraordinary operative ability in a profession that requires the hands to be a second brain, possessed with a special sense, as long as one of his hands is so awkward that he could not butter a piece of bread with it.

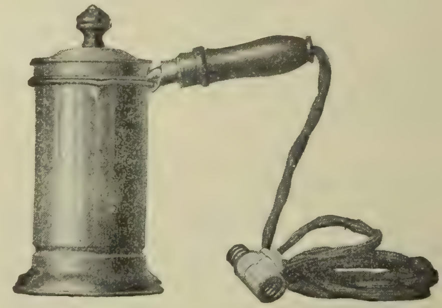
The clinician stated further that acquiring ability to manipulate instruments with both hands is not nearly as difficult as at first appears. It requires a determination to begin, plus perseverance; the position and the movements of the trained hand must be observed closely as well as how the instruments are held. A few earnest efforts will produce surprisingly good results.

Dr. Dewey Duane Smith, Sandusky, Ohio. "The Application of Westinghouse Electric Heating to Dentistry."

By the use of the Westinghouse Four-inch-disk Stove, which is guaranteed against burn-out, a gold annealer can be made by placing a piece of mica or small aluminum pin or ash tray on the top. After the gold is annealed perfectly, the current is turned off and the heat of the stove will be retained long enough to keep the gold in perfect working condition.



This same stove can be used for drying out investments, warming unvulcanized rubber in the packing of plates, heating gutta-percha; it may also be employed as a water-heater by placing a small piece of asbestos under the water glass, and can be put to many other uses that will suggest themselves to the operator.



The "Westinghouse milk-warmer" is a most convenient small sterilizer, and an almost instantaneous water-heater. With the sterilizer basket—designed by the writer—to fit inside the milk-warmer, small instruments, burs, broaches, and the like can be sterilized.

Water will boil in this heater in two minutes. The heating element is inside the water instead of being underneath the vessel, thus assuring full efficiency.

This vessel is also guaranteed against burn-out.

Dentists often need a little warm or hot water at the chair at once. This apparatus solves the problem.

The "larger dental sterilizer" is operated by the immersion element in the same way as the small one. This, as all other Westinghouse products, is fully guaranteed against burn-out.

The immersion element, or heat-producing part of these apparatus, consists in ribbons of metal laid between sheets of mica, then put under a pressure of ten thousand pounds and sealed with an oxy-acetylene blowpipe, thus excluding the oxygen and making the instruments non-oxidizable.

Dr. I. W. Copeland, Ashland, Ohio. "Helpful Hints for the Use of a Vacuum Cleaner."

A suction sweeper or vacuum cleaner may be used for operating spray bottles, hot-air syringes, in fact, for all operations in which compressed air is indicated. It may also be used in operating a blowpipe and a vacuum casting machine; in the latter it offers the advantage of giving a constant powerful suction which may be continued until the metal has solidified, thereby doing away with the tendency of the metal to assume a spherical shape. The vacuum cleaner may also be employed for removing infected débris from cavities during preparation, in place of the chip-blower, which subjects both patient and operator to the danger of inhaling the débris. These, and many other uses of this machine which will suggest themselves, enable the operator to keep his office or laboratory absolutely free from all dust.

In adapting such a machine to the dentist's needs it is best to place it in the laboratory or some other part of the office where it will be out of the way, and where the slight noise which the apparatus makes will not be objectionable. The power can then be conveyed to any portion of the office, or to as many different points as desired, by means of a half-inch galvanized pipe fitted up at each opening with a valve and nipple for the connections. In conjunction with the piping may also be installed electric connections so that the apparatus may be started from any point. Foot switches may be used for this purpose, if desired.

The casting apparatus which may be operated with this machine consists of a base for the investment rings to rest upon, to which is attached a short piece of one-eight inch pipe with a valve for controlling the pressure in casting. There are two openings in the various types of vacuum cleaners, the air being drawn in at one and forced out at the other, and in this way the blowpipe may be operated at the same time that the suction feature is utilized.

NORTHEASTERN DENTAL ASSOCIATION.

Seventeenth Annual Convention, held at Portland, Me., October 26, 27, and 28, 1911.

THURSDAY—*Afternoon Session.*

THE seventeenth annual convention of the Northeastern Dental Association was held in the assembly hall of the Lafayette Hotel, Portland, Me., October 26, 27, and 28, 1911.

The first meeting was called to order by the president, Dr. H. A. Kelley, Portland, Me., October 26th, at 3.30 o'clock Thursday afternoon.

Dr. W. E. BOARDMAN moved that inasmuch as the proceedings of the last meeting had been published and sent to the members, the reading of the minutes be dispensed with. (Motion carried.)

The next order of business was the report of the Board of Censors, which consisted of the presentation of the list of applications for membership.

Dr. BOARDMAN moved that the rules be suspended, and the secretary be instructed to cast the ballot of the association for the list of applications. (Motion carried.)

The next order of business was the report of the Treasurer, Dr. DAVID MANSON, Burlington, Vt.

Dr. BOARDMAN presented the report of the Auditors, after which the report of the Treasurer was approved as read.

Dr. KINSMAN reported, as the report of the Program Committee, the program as printed and distributed to the members.

The report was approved.

Under the head of new business,

Dr. BOARDMAN moved that a committee of three be appointed to bring in a list of nominations for officers for the coming year.

The motion was carried, and the president appointed the following as the Committee on Nominations: Drs. W. E. Boardman, E. S. Gaylord, and W. S. Payson.

Dr. C. H. HAYWARD, Peterborough, N. H., presented in person his resignation as an active member of the society, expressing his regrets in being forced to do so on account of age.

Dr. BOARDMAN moved that the resignation be accepted. (Motion carried.)

Dr. BOARDMAN also moved that Dr. Hayward be elected an honorary member of the association. (Motion carried.)

The meeting then adjourned until the evening session.

Evening Session.

The meeting was called to order Thursday evening at 8 o'clock, by the president, Dr. Kelley.

Dr. N. A. Stanley was called upon to take the chair while the president, Dr. H. A. KELLEY, Portland, Me., read his annual address.

After a short discussion of the President's address, Dr. GAYLORD moved that a suitable time be arranged for a discussion of the question of the reorganization of the National Dental Association, and that Dr. Ottolengui be asked to be present and to take part in the discussion. (Motion carried.)

Dr. A. J. SAWYER moved that visiting dentists be accorded the privileges of the floor. (Motion carried.)

Dr. Kelley resumed the chair, and announced as the next order of business for the session an address by Dr. R. Ottolengui, New York, N. Y., entitled "The Advantages of Early Treatment of Malocclusion," which here follows:

The Advantages of Early Treatment of Malocclusion.

Mr. President and Members of the Northeastern Dental Association,—I wish to discuss with you the question of early treatment of malocclusion, and first, the question of just what is meant by early treatment. It is not so very long ago when it was commonly taught in the schools—and it seemed rational enough—that before we could regulate teeth, the teeth must erupt. But today that is no longer a tenable point, because I shall show you that we cannot only treat irregularities before the teeth have erupted, but that we can often do it much better before than later.

Let me say a word to the general practitioner in regard to practicing this branch of dentistry. I am not radical enough to claim that the general practitioner should never correct malocclusions. There are many cities and localities that are too small perhaps to support an exclusive specialist, and in these sections it should be as in medicine—the local practitioner should be competent to do whatever is indicated. One difference between the man practicing orthodontia in small towns and the specialist would be that the former would do less of that work, because he would have less to do, but he should know just as much about the subject as the latter. Dental magazines and dental literature are teeming with information on orthodontia, and text-books on this subject appear almost annually. There is one on the press now that I know of, and another being written. So that men even in the small towns should have sufficient knowledge of orthodontia now to do as the medical man does, *i.e.* make a proper diagnosis, and in making the diagnosis determine one of two things; first, whether he can himself competently carry the case to a successful issue, in which instance he would be entitled to treat the case; or, if the diagnosis tells him that the case is beyond his skill, then, in the interest of the patient, he should refer him to a specialist, and inform the patient and the specialist of what is required.

This means that the general practitioner should understand a great deal of what the specialists are doing, and he should have a comprehensive knowledge of the diagnosis and the general purpose of the science and art of modern orthodontia. This brings me to the point of saying that the general purpose of orthodontia has changed very materially in the last few years, ten or fifteen years having made a complete revolution in that branch. Originally, it was largely a matter of esthetics and of beautifying the individual. Mothers or fathers, more often mothers, noticed that their child's teeth were "crooked." That was an odd word to use, but it was the word employed. Human teeth are very rarely crooked, but the parents meant that the teeth were irregularly placed in the arch. They therefore consulted a dentist to have the crooked teeth straightened, because at that time the dentist only straightened teeth. Then came the word malocclusion, and that changed the whole complexion of this question, and the viewpoint, because as soon as we used the word malocclusion we thought of its antithesis, occlusion. When we began to study occlusion, we began to discover the important rôle that dentistry plays in medical science, namely, that the mouth is the portal of all physical good and ill that befalls the human being. The individual must have air, water, and food; food must pass through the mouth, and must be prepared properly, for the organs to perform their various functions in the act of nourishing the body. If an individual has a good masticating apparatus and does not masticate his food, cares nothing for Fletcherism, and is in such a hurry in his chase of the American golden eagle that he can spare only two minutes for eating a pound of meat, that is his fault; but if he has a masticating apparatus which is abnormal, then it is impossible for him to masticate his food properly. Thus today we realize what we are dealing with in the growing child. If the child cannot masticate his food properly, it cannot nourish the body. Just think what the system of the child is called upon to do! The adult's system is merely called upon to replace the lost tissues of the body. If a child displays the same amount of activity, and therefore produces the same proportion of waste tissue, he must add to his body not only the equivalent of this waste, but also the tissue needed to make up his growth. Considering that point, is it strange, then, that we say that malnutrition brings about a lack of proper growth?

I wish that I could have had the time to look about the city, select two or three children, bring them here tonight, and have them stripped to the waist and ask them to breathe. You will find that nearly all ill-nourished children do not breathe from the diaphragm, but up near the throat. When asked to breathe, they will lift up their shoulders and pull in the diaphragm, instead of the reverse. These children do not obtain enough oxygen, and therefore do not secure a sufficient amount of nourishment, so that it is not surprising that they are lacking in development.

Orthodontists, like all specialists, are inclined to keep their eyes glued to one portion of the body, so much so that in the past they have laid particular stress simply on the profiles and full faces of children. It remained for Dr. Serino of Madrid to take pictures of children stripped to the waist, and thus to show the lack of development throughout the body—not in the jaws alone. There is no breathing power in the lungs, no full development of chest, arms, or legs in such children, and this is largely attributable to the fact that they do not properly masticate their food and do not breathe properly. This causes lack of proper metabolism, which in turn causes lack of development; this in turn causes irregularity of the second denture, because all of these disturbances of function, occurring during the time of the development of the second set of teeth, before their eruption, leave the child improperly prepared for the eruption of the teeth, hence we have irregularities.

In the last analysis we will find in every case, whatever the etiology be, the active and primary cause to be lack of development. I am not prepared to prove this, still I believe it, because I can better comprehend a lack of development than an overgrowth of the part, except such hypertrophies as may be purely pathological. If we see a disparity between the upper and the lower arch it would be a fair assumption, from my point of view, that the larger arch is normal and the smaller is undeveloped.

(The speaker then showed a number of illustrations to prove the advisability of early treatment of malocclusion.)

Discussion.

Dr. R. H. W. Strang, Bridgeport. The subject of Dr. Ottolengui's talk appeals to me very much. A broad statement, perhaps you may think, but in my mind a true one, is this—"All malocclusions, no matter how complicated, could have been prevented, if the cause had been detected and removed in time." From this category two classes of cases should be excluded, *i.e.* those in which the deformity is due to supernumerary teeth and those in which it is due to missing teeth. If this statement be true, is not the theme well worth considering, especially when we call to mind some of the terrible deformities which seek relief late in life?

In order to carry out preventive treatment, it is absolutely necessary that we be thoroughly familiar with normal development, for without such knowledge we are not in a position to detect the abnormal when it first makes its appearance. Of equal importance is an insight into the etiology of malocclusion, in order that such causative factors may be discovered and obliterated before producing their harmful results.

Let me mention two or three important reasons for early treatment that have not been touched upon by the essayist. All of us are well acquainted with the nervous symptoms and reflexes associated with an impacted third molar, the systemic results of which condition are far-reaching. Just stop to consider, then, that in all of these cases of under-developed arches there is not only one tooth, but many, being held within the bone, unable to force their way into the oral cavity. What may not be the result on the highly sensitive nervous system of a child at this age from the pressure of these impacted teeth in their attempt to erupt in arches far too small for them? Dr. Barnes of Cleveland, in an essay read before the last meeting of the National Dental Association,* developed this thought clearly and powerfully.

Another reason for early treatment that I would mention bears somewhat on the practical side. The working of the expansion arch is extremely complicated. In fact, I doubt if you could find any orthodontist who will admit that he absolutely understands this wonderful appliance. If the men who are using this device every day are unable to fully master it, then surely it is safe to say that the general practitioner does not thoroughly understand its intricacies. If the expansion arch is used on the deciduous teeth by one who is not an expert with it, there is far less danger of harm resulting than if it is used on the permanent teeth. The most frequent mistake made is the displacement of the anchor teeth. An absolutely accurate adjustment is necessary in order to avoid this, and it requires considerable experience before such an adjustment can be made. If, however, the appliance is placed on the deciduous teeth, using the second molars for anchorage, the effect of the displacement of these teeth is not so disastrous as that resulting from the accidental moving of the first permanent molars.

One of the arguments often advanced against early treatment is the uncertainty of the permanent teeth erupting in normal occlusion after the deciduous arches have been developed. To be sure, one cannot say that the permanent teeth will take their correct position after such treatment has been carried out, but the following statement can be made to the parents: "We will place the deciduous teeth where nature should have placed them at this age, and in so doing will give nature every possible chance to bring the permanent teeth into their proper position. We will relieve all dental impactions with their nervous symptoms, and will develop the nasal cavities to the size proper for their age. Then if we find later that nature is not able to finish her work successfully, we shall not be handicapped with years of mal-development, but need only to take up the case again where it was left at the end of the previous treatment, and finish the work that nature failed to do." So in all our treatment—our aim should be simply to aid nature, always carrying out our work along normal lines, bringing the case up to that period of development which corresponds to the normal for that age, and incidentally by such treatment stimulating nature to do better work.

I am glad that the importance of type and its bearing on the treatment of malocclusion has been mentioned. As there is no normal type for the American, each operator has to use his own judgment in planning the architectural line for the completed denture. The influence of type is so important that Dr. Angle has included it in his definition of the "line of occlusion." According to him we find that—"The line of occlusion is the line with which, in form and position, according to type, the teeth must be in harmony if in normal occlusion."

I should like to ask Dr. Ottolengui one question: Did I understand you to say that the statement had been made that if the teeth were placed in normal occlusion, a perfect type would always be established?

Dr. OTTOLENGUI. The highest type.

Dr. STRANG. I believe you must have misinterpreted that statement. A qualifying clause must necessarily be included in such a remark, and one which strongly emphasizes the importance of the subject previously discussed. The dictum that I believe Dr. Ottolengui has reference to is this: "If the teeth are placed in normal occlusion *at a sufficiently early age,* and normal development is continued, then the highest type for that particular individual will be reached." I would refer to Dr. Pullen's case [one which had been shown on the screen] as one of the best arguments for preventive or early treatment. The boy shown was probably fourteen or fifteen years of age, when treatment was begun, and although the teeth were placed in their normal relationship and a wonderful improvement was obtained, yet the highest development of type was not reached. Why? Because nature was not able to overcome and obliterate the effects of mal-development which were the result of the perversion of the forces of occlusion for years. If this case had presented for treatment just at the time when the mesio-distal relation of the arches was being changed, and such a change had then been prevented and normal development continued thereafter, without a doubt the highest type for that individual would have been reached. In other words, preventive treatment will allow nature to carry on her work normally, resulting in a perfect development of the highest type, while corrective treatment will only cover up the worst defects, with a result crippled by the loss of normal development through all the years of malocclusion.

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* See DENTAL COSMOS, January 1912, p. 1.

Dr. S. H. **Guilford**, Philadelphia. This is a subject in the discussion of which I always take great interest, because I have given much attention to it during a long period of years.

When I was graduated from college in 1865, the only text-book on operative dentistry available was that written by Dr. Taft. It was not a very large book, but it covered the whole subject of operative dentistry as it was then understood, the space devoted to orthodontia, which we called correction of irregularities, amounting to only a page and a half. That would seem today like orthodontia in its swaddling-clothes, and the changes and developments that have occurred in this branch of practice since that time are not only astonishing, but positively marvelous. It has been my privilege to see these changes, which to me are more impressive, probably, than to others who have not seen so many of them. It is wonderful to think that only forty-odd years ago almost nothing was known about the corrective treatment of malposition of the teeth, while today it has attained the position of a real science, in which positive results of the highest character are obtained.

Orthodontia, roughly speaking, has passed through three stages of development. First, the stage in which, if certain teeth were found erupted in irregular positions, the parent would take the child to the dentist for the purpose of having that irregularity reduced. In other words, it was noticed that certain teeth were not in position to form a normal arch; a deformity had developed, and the parent wanted that deformity corrected. In those days there were very few appliances for that purpose, and it was quite natural for the dentist to feel that the best way to correct the condition was to extract a tooth here and there, and by that means obtain space so that the misplaced teeth could be brought into the arch. The only object in view at that time was to improve the physical appearance of the child. It was also recognized that even after sufficient space had been obtained, and after a certain amount of uniformity in the position of the teeth had been brought about, the child was still deformed, because there was a lack of development; the position of the teeth had been changed, but there was a disparity in the size and position of the two arches.

Then followed the second stage in the development of orthodontia, when we tried to correct these irregularities in such a way as to bring the teeth into more or less normal occlusion, and this was brought about largely in 1884 or 1885 by an American dentist in Paris, Dr. Davenport, who wrote a series of articles illustrated with models, to show the effect of imperfect occlusion. He elaborated the evil results of extraction by which the position of the other teeth are changed, and so much of the tooth surface is thrown out of use. He felt that it was simply a matter of common sense to realize that if Providence had arranged for man to have so many teeth, with a definite amount of contact between the teeth of the two arches for the purpose of mastication, whenever we interfered with the relation of these teeth by extraction the individual would be injured to the extent of one-tenth or one-twentieth, or a similar amount, in his masticatory power. As the result of Dr. Davenport's work extraction fell into gradual disfavor. About that time an appliance was invented by which we could expand the arch and draw the teeth into normal position, so that the teeth in one jaw could be placed in relation to those in the other jaw in such a way that the act of mastication could be perfectly performed.

The third stage of development is that of the present time, when we recognize that whenever possible, not only should all the teeth be in the jaws and in proper occlusion, but that by bringing them into that relation, we are assisting nature in bringing about the condition originally intended, by developing the bones of the face, and allowing the different sinuses to be filled with air for the proper expansion of these, so that they will assume their normal proportions. That means, of course, that the importance of orthodontia work is greater than it has ever been before. It means treating the individual who has developed a state of abnormality and aiding nature in restoring the parts to a normal condition. This is what orthodontists are doing today.

Another point I wish to speak of is that our corrective measures, whatever they may be in any department, are influenced largely by what the masses at large want accomplished. In the first place, their idea was simply to improve the appearance of the child so far as the teeth were concerned. In the second place, they realized that there must be a proper occlusion of the teeth, a proper arrangement of all of them, in order to get the best results. Afterward, as said, they realized that by methods as employed today the facial expression can be restored from a condition of homeliness to one of almost positive beauty. But in order to accomplish this, it is important that the work be done at an early age; it must not be delayed until too late. The object of the paper tonight has been to impress on the general practitioner the importance of recognizing these conditions early, and then using corrective measures promptly, in order to correct that which has been irregular and abnormal. In this the general practitioner has an important *rôle* to play; he must realize that whether or not he is interested in orthodontia work, it is his duty to understand it sufficiently so that, when he sees an abnormal condition of the teeth developing and cannot correct it himself, he will refer the patient to an orthodontist. I know that the orthodontists of today and those who may take up orthodontia within the next ten years will not be able to attend to a one-hundredth part of the cases of irregularities that occur. Many of these cases are not noticed, or perhaps are disregarded, and others are turned aside because the dentists who are appealed to do not understand the importance of the work or are afraid to undertake the treatment.

The attitude of many practitioners in different phases of dental work is reflected, or foreshadowed perhaps, by that of many students in college. Every year, when I start on my course of lectures in orthodontia, I begin it with some temerity, not because of the duties imposed upon me, but because of the fact that many of the students, while they may take a general interest in the subject, do not take a specific interest in it. They say: "I do not expect to practice that branch of the art, therefore it is not necessary for me to follow closely the details of the subject." They look upon it as a difficult subject and one entirely aside from the regular practice of dentistry, and dismiss the matter by saying they would rather have someone else undertake such work. I try to make it clear to them that whether they are especially interested in this subject or not, they must care for it; it is their duty as dentists to understand the general principles sufficiently to be able at least to recognize abnormal conditions in the earliest stages, and be qualified properly and intelligently to advise their patients in regard thereto. If the general practitioner will take the trouble to inform himself of the different conditions that prevail in the early stages of malocclusion, and then see to it that these patients are cared for, this matter of the treatment of irregularities will be reduced to a minimum.

In other words, the dentist should recognize that he is the guardian of the patients' mouths, not only older patients but children especially, and he should feel enough responsibility for those under his care to see that they get the best attention possible in this matter as well as in all others. Therefore, if dentists will take up this subject and interest themselves in it, the dental and facial deformities we now see on every hand will almost entirely disappear. In addition, such practitioners will find after a while that their interest in the subject will grow, and when in the course of time they see what attractive work it is—aside from its usefulness—they will be impressed with the beautiful results obtained, and be satisfied that they have done more for their patients by preparing themselves for this work than they could have done otherwise. We often observe that students who go out from college with little interest in this subject, after being compelled to take up the work finally become interested in it.

Every year we have cases in which children have to be carried in their orthodontia work through the summer or through a period when they are away from home at school. Necessarily, under these conditions, the attention which the dentist in charge of these children can give them is but limited, and during the time they are away they must be under someone else's care. During that time we are glad to refer the patient to some dentist in the neighborhood of the school to take care of the case, and if the dentist who is appealed to under these conditions admits that he cannot do anything for the patient, even under the direction of the practitioner who has charge of the case, he lowers himself in the opinion of the people. Time and again I have referred patients to dentists under these circumstances, but many of them would not accept the case because they did not want anything to do with orthodontia work, and it was difficult for me to find someone to carry along these cases even under my written instructions. This I think reflects on the intelligence of the dental profession. Many practitioners, when once induced to take up this work, find it very attractive, constituting one of the most interesting features of dental practice. When, in the course of time, I shall retire from the active practice of dentistry and reflect upon what I have accomplished in my professional career, my pleasantest recollections will not be the ordinary operations performed for my patients, but the reflection that during my practice I have been able to treat children whose physiognomies were positively disfigured, and change them to lines of harmony and beauty, so that these individuals or children, who otherwise would have had to go through life deformed and an annoyance to themselves and a reproach to their parents, have been given a facial expression such as Providence intended them to have.

Dr. **George T. Baker**, Boston. The essayist has apparently given to this subject very careful attention and thought, and has presented to us a very comprehensive view thereof.

It is generally accepted that all corrections should be undertaken at a very early period in life. Like bad habits, the earlier they are gotten rid of, the better, and the essayist has given us reasons which certainly must appeal to us, as for instance the moving out of the bicuspids when they are interlocked with the deciduous molars. He also expresses himself very forcibly in describing how to move the apex of the bicuspid before there is any apex.

Dr. **J. M. Magee**, St. John, N. B. First of all I want to thank you, Mr. President, and your fellow members for the courtesy extended to me. Some years ago I attended a meeting of this association, and was at that time also extended the courtesies of the floor. I may say that I come from across the border, Canada. Recently a great many articles on reciprocity have been published. Whatever barriers may be placed upon the business relations of countries, there should be no barriers against reciprocity in the dental profession.

I have known Dr. Ottolengui for a good many years from a distance, and once or twice I have encountered him at close range, and I can well appreciate his efforts. I remember a number of years ago having visited him, when he showed me a case of Dr. Kingsley's in which the bite had been *jumped.* At that time critics told him that he did not jump the bite, but that the casts were changed. I know, however, from what I have seen since then that he did jump the bite. Dr. Ottolengui has spoken of the age at which the correction of an irregularity should take place, saying that the best time to move the apex of the bicuspid was before it was developed. I may use a similar expression and say that the best time to correct irregularities is before the child has any teeth; the time to begin is the very earliest—we should begin the day the child is born. There is nothing in life that will ever offset fully the influence of artificial feeding. The child who nurses from the breast begins to earn its bread literally by the sweat of its brow. If you have seen a child nursing in the normal way, you will have noticed that the face is covered with beads of perspiration, but I venture to say that in an artificially fed child you have never remarked that condition. In the act of nursing a number of muscles are brought into play, the tongue begins to enlarge immediately, the mandible is forced outward, the buccinator muscles are exercised, and all these organs work together in the development of the bones of the face. While the child is nursing it is breathing through the nose, and the fauces are widely opened. After the child has nursed for months, the effect cannot but be seen in after life. I have given this matter a good deal of consideration. Rhinologists invariably tell me that the child with narrow nares is bottle-fed. The histories of the cases I have treated confirm this statement in regard to the jaws and other portions of the face. I have never yet seen a case of malocclusion of the deciduous teeth in a properly nursed child except in cases where thumb-sucking or some other abnormal habit has moved the teeth. I have, however, observed abnormal occlusions in artificially fed children, and have never yet seen normal occlusion of the permanent teeth in a bottle-fed child. I may be wrong in this observation, but, to repeat, I have never noted abnormal occlusion of deciduous teeth in a breast-fed child, nor normal occlusion of permanent teeth in a bottle-fed child. In many walks of life we see the effects thereof. I have in a number of instances traced the history of singers, and have never yet known a singer of more than local reputation who was not a nursing child. I imagine that the history of a great many public speakers who are gifted with powerful voices could be traced to their breast-feeding.

Dr. N. A. STANLEY, New Bedford, Mass. As a general practitioner I am more or less interested in orthodontia. When I was graduated, orthodontia was not taught in the colleges or given any consideration whatever, and while I did not take readily to it in the early days of my practice, cases of malocclusion continually presented themselves for correction.

This is one of the deepest subjects in our profession, and one of the most satisfactory. I had to take an interest in this work and study it because it presented itself to me, as it does to every practitioner, and now I have developed a love for it and am doing more of it all the time, and, as Dr. Guilford has said, the results of this work are most gratifying. Many of my patients are more or less charity cases, but more real pleasure and satisfaction is derived from correcting a deformity for an appreciative patient than comes from the collection of a large fee.

Dr. Ottolengui has presented to us a most inspiring paper for the general practitioner, who should acquaint himself with this branch of dentistry. If he is interested in the profession, every one of its branches should receive his attention, and not merely a passing glance. He should master all phases of dentistry as best he can.

I would like to ask one question in regard to moving the apex before it is fully developed. What would be the probable result—would it develop in a straight line or would it be crooked?

Dr. C. F. Bliven, Worcester. If our Canadian friend has given us the panacea for all irregularities, orthodontists will soon disappear from the face of the earth, but unfortunately I am afraid he is wrong, and we shall have to go farther back than the period of conception to be able to produce children of a beautiful type. In order that our women may be able to nurse their children, they must begin to build at an earlier stage, if their children are to have properly developed natural jaws. Of course there are hundreds of malformed jaws in existence now, and will be for years to come, that will enable the orthodontist to earn a living, but I hope that the American race is awakening to the necessity of producing a type of women different from those of the present. We have the abnormal type of beauty today, and we cannot go back farther than that at the first step, but after a number of generations it is possible that the American people, guided by the intelligent American dentist, will build a race which will be equal if not superior to the old Greeks. The great hope lies in the awakening of the consciousness of beauty among our people, the desire for a more beautiful race, for more beautiful children. Mothers will bring children to the orthodontist as soon as they have learned what he can do for them, and after a few generations the abnormal type of the present day will disappear. As the face and the lines of beauty develop, so must regeneration follow in the body as a whole, and the American people, who stand pre-eminent in dentistry today in advance of any other race, will be, we might say, the fathers of that future generation.

Dr. Ottolengui (closing the discussion). It is very gratifying to find so much interest in the discussion on this subject, and I have no exception to take to any of the remarks made.

The remarks of Dr. Magee and Dr. Bliven remind me of a talk Dr. Atkinson gave in Atlanta a good many years ago. He was talking in his idealistic way of the improvement of the race, and some man seated in the back of the room said: "If you are going to do that, you will have to go back to the grandparents." Dr. Atkinson's reply was: "We are working on future grandparents now, when we work on children." So, as has been pointed out, there is no doubt that orthodontia will finally bring about the building up of a better and physically more perfect race.

I was particularly interested in what Dr. Magee said. In the beginning he seemed to be joking, yet he brought out a very serious thought, which I think coincides with my remark as to the highest aim in orthodontia, and which was introduced with the word malocclusion to define this difficulty, and which inspired the study of normal occlusion and all its concomitants. Nourishment of the body depends upon the proper preparation of the food. Dr. Magee has taken us back to the time before the teeth have erupted, and points out that the proper nourishment of the body depends upon the manner in which food is prepared for the stomach. That reminds me of an interesting incident told to me by Dr. Bonwill. He went on a vacation at one time, leaving behind him a fairly chubby grandchild of about two months of age. Shortly after he had left, the mother ceased to be able to nurse the child, and was obliged to use the bottle. After he was gone for two or three months, he received a telegram to come home, because the child was dying. Upon returning he found a little emaciated infant. He looked at the figure of the child and found that it was practically starving, as it was not getting the proper nourishment. He reasoned in the same manner as Dr. Magee has suggested, that the child was not obtaining nourishment from the mother, and was not working for its living by securing its food by the sweat of its brow. If you have seen a child nursing you will have observed that it uses the hands as well as the mouth on the mammary glands. I have seen kittens and puppies do the same thing. It seems to be nature's way of affording exercise and development to the arms along with the reception of the food, also a general activity of the whole body. The infant cannot take exercise by walking, but is taking its exercise while taking its nourishment. Give the child a bottle filled with milk with a nipple which has a great hole in it, and through which the milk can be drawn with very little suction, and the baby gets no exercise at all. Dr. Bonwill took one of these nipples, and on the inside added a second nipple, extending down into the bottle, with a small hole in it. In this way the feeding process was radically changed, because the child had to suck the milk through the tiny hole in the lower nipple and up into the vacuum, and thence into the mouth. That was all the treatment given to the child, and in a few months it was regenerated. Dr. Bonwill tried to put that nipple on the market, but the manufacturers said they could make as much money with a single nipple as with a double one, and that they were not interested in the growth of children.

I wish to say a word about the duty of the general practitioner of dentistry in relation to the extraction of deciduous teeth. Dr. Strang emphasized an exceedingly valuable point when he said that two conditions could not be remedied; one is extra teeth that may come under the head of supernumerary teeth, and the other the lack of teeth. It unfortunately occurs more often than we think that bicuspids or other permanent teeth are absent; the general practitioner should therefore be very cautious before removing deciduous teeth without being sure that permanent ones are present in the jaw. Only last spring I had an experience that taught me a severe lesson in this respect. In one of the cases that I have been treating I found everything developing beautifully except that the four deciduous second molars had not been shed, and I felt that if they could only be out of the way, the child would gain a great deal during the summer by the eruption of the bicuspids. Thinking that the case had advanced to such an extent that they should be removed, I extracted these molars and inserted an appliance for retaining the spaces that the bicuspids would occupy. What I should have done was to have had radiographs made to determine whether or not the bicuspids were present, but the radiographs cost ten dollars each. I did not wish to add forty dollars to the cost of extracting four deciduous teeth. When the child came back to me in the autumn, I found three bicuspids erupting properly, but no sign of the fourth. Then I had a fearful realization of the fact that I might have removed a sound deciduous molar that might have remained during life, and that the child might not have any bicuspid. I would rather have such a molar retained than extract it and not have a bicuspid fill the space, because even if it were shed a few years later, the time would be more propitious for filling that space with bridge work. A radiograph disclosed the bicuspid impacted high up, so that after all I did not do any harm in removing the deciduous tooth, and the permanent one will, I hope, erupt into the space provided for it.

I only relate this instance as a caution against extracting sound deciduous teeth unless the operator is sure that their successors are present in the arch.

(To be continued.)

THE DENTAL COSMOS

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Devoted to the Interests of the Profession.

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EDITORIAL DEPARTMENT.

PREPARATORY STANDARDS.

EFFICIENCY, the power of accomplishment, consists of the successful application of the right kind of energy to a given purpose or object. It is the result of an harmonious correlation of cause and effect, the adaptation of means to ends. Efficiency in dentistry, as in everything else, is attained by the application of the underlying principles here referred to, and it cannot be attained where these are disregarded. To the exact extent that these basic considerations are neglected or overlooked will the results in all departments of dental activity fall short of the full measure of efficiency otherwise definitely attainable.

In no phase of our professional interest is there a more evident need for serious and thoughtful study of the efficiency factor than in our educational system, if such it may be called, as related to the demands of dental practice. And this applies not only to the professional curriculum itself, but with equal if not greater force to the preparatory educational training leading up to and required for entrance upon the professional course of dental study. The demand for better preparation of matriculants has stimulated an increased stringency in the standards of admission to all schools of dentistry and of medicine, and the tendency is to still further raise the admission requirements. Yet the evidence is beginning to accumulate from practical experience, where it has been possible to compare the results measured in terms of efficiency—as between, for example, a two years' collegiate training and a four years' standard high-school training—that the difference in the intellectual efficiency of the two classes of students so prepared is so small as to constitute a negligible quantity. Indeed, in some cases the difference was in favor of the high-school preparation when compared as class with class.

That four years of high-school training plus two years of college is a better training than four years of high school with no collegiate training is, other things being equal, a self-evident proposition; but, unfortunately, other things are not equal. The boy whose circumstances are so limited that four years' free education in a high school mark the limit of his possible academic training, and who knows that he must make the best of his opportunities in order to qualify himself as a breadwinner, has no time to waste nor extra money to spend in frivolity. Such a student is more likely to take his work in the professional course seriously and get the most out of it; while the boy whose parents are sufficiently well off to enable them to give him an additional two years at college, too often embraces the opportunity to spend those additional years in "having a good time"—in saturating himself with "the spirit" of the place, by going in for athletics and the multitudinous social diversions, fraternity life, etc., that constitute so large a factor of the collegiate *menage.* These influences tend to disturb if not to dispel whatever serious-minded effort he may have previously cultivated in relation to his educational work, and in comparison with his less fortunate colleague of the high school, he too often makes but a sorry showing.

The mere record of time spent in preparation as a measure of educational efficiency is fallacious as a standard for admission to the professional course. The real question is, What does the candidate know?—not, How long a time has he spent in acquiring what he knows? It is frankly conceded that the time element is an important consideration, which should doubtless be taken into account in determining the fitness of a candidate; but it is of secondary and not of primary importance. The principal defect of our system for testing educational fitness for admission to professional schools is that it is based almost wholly upon the time factor. Each of the several unit systems at present in vogue as standards by which the fitness of candidates for matriculation is measured is essentially based upon a time unit of measurement. A student must devote so many hours of study or recitation per school year to a subject in order to earn the prescribed number of "units" allotted to the subject. As a considerable degree of latitude is possible in the election of courses upon which "counts" or "units" may be earned—and especially is this so under the examination system of New York—the character of the matriculant's preparation, in so far as its kind is concerned, is to a large extent a matter of his own choice. Further, the elective feature in many high schools is so flexible that it not infrequently happens that a candidate presents certificates showing that he has taken partial courses in a large variety of subjects, sometimes nearly double the number in the normal curriculum, with the result that, while having earned the required total of "units," his education is a smattering acquaintance with a variety of things, with no adequate training in any one subject and a mind totally lacking in the ability to logically reason about anything.

If we are to have efficiency in the practitioner we must have thoroughness in his preparatory training. A diffuse or unrelated schooling is worse than useless. The training of the matriculant should be intensive, concentrated upon the essentials necessary to his life-work and his efficiency as a social unit. An intensive training lays the foundation for unlimited self-education throughout life; a diffuse education destroys the ability to concentrate attention intensively on any educational problem.

A reformation in the mode of preparation for the professional curriculum is urgently needed;—the kind and character of required study is vastly more important than its amount, or the number of hours spent upon it. With such a basis of preparation the certificate plan of admission to professional schools should be abolished, and the efficiency of the candidate be tested by a rationally constructed and honestly conducted entrance examination.

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THE PREVENTION OF DENTAL CARIES AND ORAL SEPSIS. (Being the Cartwright Prize Essay of the Royal College of Surgeons of England for 1906–10, with some additions.) By H. B. PICKERILL, M.D., Ch.B., M.D.S.Birm., L.D.S.Eng., Professor of Dentistry and Director of the Dental School in the University of Otago, N. Z. London: Ballière, Tindall & Cox, 1912. Price 7s. 6d. net.

In this volume of approximately three hundred pages is contained the results of the original investigation by the author and his assistants of the problem of the causation and the prevention of dental caries and oral sepsis. It is the result of six years of research along definitely planned lines of investigation dealing with a large part of the recognized causative factors in the production of dental caries.

The author modestly states in his preface that the work is still incomplete, but that sufficiently important conclusions have been reached, in his opinion, to justify publication. A careful perusal of the book enforces the conclusion that not only was the author justified in the publication of the results of his labors, but that the importance of his experimental work, as well as his deductions therefrom, make the report of those labors one of the most important, if not the most important, contributions to the literature of dental caries that has appeared in modern times. Certainly not since the publication of Miller's "Mikro-organismen der Mundhöhle" has any work appeared upon the subject of caries involving anything like the same character and amount of scientific research or work from which more important conclusions could be drawn.

The author has courageously and intelligently attacked the greater number of those underlying problems with reference to dental caries which must necessarily be solved before we can say that we know the causation of dental caries. These problems he has subjected to the rigid scrutiny of scientific test by original methods of research; and from the data which he has obtained by experimental methods he has not only deduced a number of important conclusions, but has furnished others with a basis and method for the study of these problems which must ultimately do much to clarify the doubtful phases of our knowledge concerning caries of the teeth.

After dealing with the historical aspect of the subject, he treats of the beginnings of dental caries and its pathology, and then takes up the subject of the resistance of the enamel surface as affected by the position of the teeth; the physical and chemical characters of the enamel surface and its powers of resistance; after which he deals with the environment of the teeth as related to the production of caries, and with the alterations in the tooth environment which arise from variations in the food habit of the individual; and as the result of his studies he offers certain constructive suggestions with reference to educational measures and to special legislation tending to correct the prevalence of caries in so far as it may be due to ignorance of hygienic laws.

In a brief review of this remarkable book it is quite impossible to allude otherwise than briefly to some of the author's more important conclusions.

With respect to the bacterial film or plaque, the author states truly that "They occur on teeth of immune people apparently as frequently as upon teeth of susceptible persons. . . . If the film of organisms is the essential origin of the acid it would tend to constantly remove itself by dissolving its base of attachment. The saliva, which almost immediately permeates all food upon mastication, contains millions upon millions of organisms capable of transforming carbohydrates into acids. Why is it then necessary to look to any particular glands for the formation of that acid? We therefore come to the conclusion—(1) That bacterial plaques upon the teeth are not an essential factor in the causation of caries; (2) That the lodgment and infection of carbohydrate material is the essential factor, and that those circumstances which afford the formation of bacterial plaques upon the teeth also afford the lodgment of carbohydrates, and so the occurrence of the two usually coincides. Therefore it is evident that the two essential attacking forces in these conditions are (1) acid-forming organisms of the mouth, and (2) the presence of fermentable carbohydrates—the first active, the second passive."

It seems to the reviewer that the author in coming to the conclusion "that the lodgment and infection of carbohydrate material is the essential factor," and that "bacterial plaques upon the teeth are not the essential factor," has overlooked the important function which the bacterial plaque may be presumed to exert in the localization of the carious process upon the tooth surface, and that by concluding that the lodgment and infection of carbohydrate material without plaque formation is the essential factor has overlooked the probable importance of soluble carbohydrates as a part of the salivary composition in susceptible individuals, and the relation of these soluble carbohydrates to the bacterial plaque as a means of localization of the carious process.

The whole of Chapter VII, which is a study of the surface characteristics of enamel, under the title "Origin and Significance of Imbrication Lines," is a revelation made possible by a new method of microscopical technique, showing the important part which is played by the variations in the physical characteristics of the enamel surface as contributory to the incidence of carious action.

That there is a difference in enamel structure and possibly of dentinal structure sufficiently well marked to fully justify the general belief among dentists in the clinical classification of tooth structure into "hard" and "soft" is fully demonstrated by the author's scientific experiments undertaken to determine that point.

He has also clearly demonstrated that the enamel structure varies in its resistance to acid action in teeth of different individuals as well as in the same individual at different ages. He promptly dismisses the plan of testing hardness of the enamel surface by resistance to crushing strain as "not meeting the case," but subjects his specimens to the accepted geological method for testing hardness by scratching the surface with a harder substance and determining the hardness by the relative depth of the scratch under equal conditions of test.

With respect to the resistance of various types of teeth to the solvent action of various acids and various dilutions of acids, the author states, in reviewing the work of Joseph Head, who had found that "While an acid of stated strength in a watery solution produces decalcification, yet in a saliva solution it produces no effect," that the observation is lacking in value, since he apparently did not estimate the total acidity of the saliva after adding the acid; and remarks further that "Obviously the acid in the saliva solution is largely if not entirely neutralized by the alkaline salts present."

The probable neutralizing power of the alkaline salts of the saliva toward acids taken into the mouth or formed in the mouth seems to have been taken for granted by the author throughout all of his work upon the saliva, to which seventy pages of the book are devoted. The writer's studies of the saliva have indicated that the alkalinity of the secretion is due mainly to the presence of di-sodium hydrogen phosphate, a salt giving a definite alkaline reaction to indicators, and where alkalinity is dependent upon the presence of the salt in question the exact nature of the reaction or combination by which the neutral point can be produced by the addition of a free acid is by no means clear. Either the acid added remains in solution as a free acid or it combines with the sodium ions to form a neutral salt, at the same time liberating phosphoric acid, which remains in the solution, giving to it an acid reaction. Such a saliva may exhibit an amphoteric reaction, but its neutrality is questionable. It is commonly taught that the lactic acid excreted by organisms in the carious process is neutralized by the calcium salts of the tooth. This probably is an error, as powdered tooth structure comprising both dentin and enamel when added in excess to lactic acid of varying strengths, has after months of contact responded with undiminished intensity to the test for free acid. The only salt of calcium supposedly entering into the composition of tooth structure which could practically neutralize free acids would be calcium carbonate, and the recent researches of H. Gideon Wells* tend very strongly to show that the calcium carbonate regularly reported heretofore as present in bone and tooth structure is to a very large extent artifact, being the product of the ashing process to which the material has been subjected in preparing it for analysis.

It is gratifying to note that the author very properly discards the records of all tests of the saliva reaction depending upon litmus as an indicator. Modern research with respect to saliva reaction has very clearly shown that records of the reaction of the saliva made by litmus alone are valueless.

It is regrettable that the author who has given so much careful attention and study to the composition of the saliva, has failed to report upon the nature of the compound upon which the varying degrees of alkalinity in the saliva as found by him depend. The most interesting and important result of his observations is that the quantity and alkalinity of the saliva secretion is definitely correlated with the character and degree and kind of acidity of the dietary.

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* "Calcification and Ossification." By H. Gideon Wells, M.D., *Archives of Internal Medicine*, June 1911, vol. vii, pp. 751–53.

With respect to potassium sulfocyanate, the author's experiments tend to confirm to a limited degree the belief that the salt in question, when sufficiently concentrated, does exert an inhibiting action upon the activities of oxygenetic bacteria, and that "There is a possibility that the constant presence of sulfocyanate in the saliva may have a beneficial effect if only it is present in sufficient quantity." From one experiment he draws the conclusion that "It would seem clear that the sulfocyanate of potassium does exert a slight antiseptic action, although it is not sufficient even in a one per cent. solution to act as a disinfectant."

The part played by mucin in plaque formation is clearly recognized by the author, who distinguishes between mucinous plaques which are precipitated from stagnant saliva and those which are precipitated by the direct action of acids. This difference, he states, "probably explains the difference between the different kinds of plaques observed. The ones which are actively precipitated by acids are firmer and more compact; those passively precipitated by stagnant saliva are softer and more viscous or gelatinous."

The factors of susceptibility and immunity as related to the food habit, and the question of the possible existence of anti bodies in the saliva as a protection against carious action are fully discussed.

The work closes with a section on General Considerations, dealing with the dietetic, educational, and legislative phases of the problem of prevention of caries.

The book is an epoch-making one, in that it lifts the discussion of prevention of dental caries above the plane of empiricism which has characterized much of the previous discussion of the question; places the problem upon a scientific foundation by clarifying many of the obscure phases of the matter through the medium of scientific research, and correlates the various factors related to the problem into a systematic and scientifically presented view of the entire subject.

Dental Disease in Its Relation to General Medicine. By J. F. Colyer, L.R.C.P., M.R.C.S., L.D.S., Dental Surgeon to Charing Cross Hospital, Royal Dental Hospital, etc.; with the Assistance of Stanley Colyer, M.D. Lond., M.R.C.P., D.P.H. With illustrations. Price $1.60 net. London, New York, Bombay, and Calcutta: Longmans, Green & Co., 1911.

The purpose of this work, as stated in the preface, is to place before practitioners of medicine those portions of odontology which have a direct bearing upon general medicine.

Consideration of the subject is divided among ten chapters, dealing with—Dentition, Normal and Pathological; Conditions which Influence the Growth of the Jaws and the Formation of the Teeth; Caries of the Teeth; Diseases of the Pulp Tissue; Diseases of the Periodontal Membrane; Diseases of the Gums and Adjacent Mucous Membrane; Oral Sepsis and Its Influence on the Body; Diseases Arising from Reflex Irritation from the Teeth; Treatment of Dental Disease in Children, and Dental Disease in Relation to Life Assurance.

Within the compass of its one hundred and eighty pages the ground has been fairly well covered. The book is a readable book, and one which contains a variety of important information which should be particularly useful to the audience of medical practitioners for whom it was written. The chapters dealing with caries, with diseases of the pulp and of the periodontal membrane, with the pathology of the gums and adjacent mucous membrane, with oral sepsis, and with diseases arising from reflex irritation from the teeth, are particularly well done.

The author leans strongly to the view that the group of disorders generally classed under the designation "pyorrhea alveolaris" are almost wholly local in origin. He calls particular attention to the factor of mouth-breathing as one of the predisposing causes of pyorrheal troubles, and properly urges with much emphasis the necessity for prophylactic treatment and the use of all possible means for securing a hygienic and functionally normal condition of the oral cavity in order to avoid local inflammatory reactions and consequent nutritional damage due to the absorption of toxic material from the diseased oral cavity. With all of which, as a fundamental proposition, the author is in agreement with the most modern views on the subject. When it comes, however, to a consideration of the means for the attainment of the ends proposed, he is not in line with modern practice when he goes so far as to recommend that in order to secure comfort in mastication in the case of children, "Small cavities, where the pulp is not involved, should be treated by means of filling. If the pulp of the tooth is exposed, the better line of treatment in the majority of cases is to remove the tooth." Or when he says of cases of general caries in children, "The goal to be aimed at in the treatment of these cases is to give the child a functional and therefore a clean mouth, and with this object it has been the practice for several years of one of the writers to treat this type of cases by the extraction of most of the deciduous molars." He then goes on to justify the removal of decayed teeth and of septic teeth apparently for the reason that no other means of treatment appears to him to be capable of bringing about aseptic conditions of the mouth.

Such portions of the text impress the reader who is familiar with modern dental therapeutics as savoring of medievalism in dentistry and as marking rather a step backward than an advance.

It is noteworthy that while the author lays much stress upon disturbances of nutrition which arise from the absorption of toxic irritants from an unclean mouth, he fails to give due recognition to the reverse order of cause and effect, namely, the influence which faulty nutrition from other causes exerts upon mouth conditions, or the importance of the malnutritional state in increasing the susceptibility to infection of the dental and oral tissues by the micro-organisms ever present in the oral cavity.

It is also a matter of some surprise that, in a work of this character and intended for the particular audience for which it is written, the oral manifestations of syphilis are disposed of in little more than one-half page of text.

Notwithstanding these deficiencies, the work will be a valuable addition to the literature of the subject and should be extremely useful in directing the attention of physicians to the importance of the oral cavity as related to local and general diseases.

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"Die Kieferbau-Grundlagen des Anomalen Arcus Dentium mit Ruecksicht auf die Odontorthopaedie." (The Basic Maxillary Structures in Anomalous Dental Arches in Relation to Dental Orthopedics.) By Dr. Otto Zsigmondy. Reprinted from *Oesterr.-Ungar. Vierteljahrsschrift fuer Zahnheilkunde*, vol. xxvi. Vienna, 1911.

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REVIEW OF CURRENT DENTAL LITERATURE.

[*La Province Dentaire*, Lyons, December 15, 1911—February 15, 1912.]

CONSIDERATIONS ON HEATED ETHER IN GENERAL ANESTHESIA IN DENTISTRY. By Dr. A. J. Danon.

After an exhaustive consideration of the history of ether anesthesia, the effects and contra-indications of ether, and the various methods of its administration, the author, on the basis of his own extensive experience, makes a strong plea for the heating of ether, for the following reasons: The heating of ether for general anesthesia is not a complicated procedure, as it is sufficient to place the ether receptacle for several seconds in a vessel containing boiling water. Ether boils at 35° C. The loss of ether from this procedure is very insignificant, if the receptacle is removed from the water as soon as the ether boils. Ether retains in the receptacle a temperature above 25° C. for ten minutes. In prolonged anesthesia it is only necessary to immerse the receptacle again in hot water to bring it to boiling-point. Measurements made during ether narcosis show the necessity for the use of a large mask. Narcosis with heated ether is established no more quickly than that obtained with the non-heated drug; about the same amount of ether is necessary in both methods. The heating of ether vapor diminishes the likelihood of its deleterious action on the bronchial epithelium. The temperature of the mixture of ether and air inhaled by the patient is higher than room temperature, and at the end of the narcosis varies from 23° to 25° C. During the narcosis itself, the average temperature of the ether rises to 29°. The use of heated ether vapors insures more favorable conditions for the respiratory system than ether vapors administered at ordinary temperature.

[*Lancet*, London, December 30, 1911.]

THE ANNUS MEDICUS: DENTAL SURGERY. A RÉSUMÉ OF THE ENGLISH DENTAL LITERATURE OF 1911.

In this valuable *résumé* of the English dental literature published in 1911, a steady progress in the position of dentistry is recorded. This progress is shown, not only in the more scientific character of many of the papers published, but also in the increased attention to the question of dental disease on the part of the general body of medical men as well as the general public.

DENTAL DISEASE IN CHILDREN.

During the year considerable attention has been given to the problem of the treatment of the teeth of school children. The views have been advanced that the best results would be obtained by organizing instruction to the parents on the care of the teeth, and then, if funds permit, adopting remedial measures for children under six years of age before attempting the treatment of those beyond that age. The reverse method is usually adopted by the educational authorities, with the result that the money allotted to dental treatment is not spent to the best advantage. Accounts of the work accomplished by several of the school clinics have been published. The London authorities have instituted lectures to parents on the hygiene of the teeth, but the treatment of the children still seems to center around the age period of six to eight years. The Council has sactioned the employment of anesthetists, but this step should have been adopted in the initial stages, for it is quite clear to those acquainted with the treatment of children that the extractions which are so often the rational preliminary to conservative operations can only be efficiently carried out under anesthetics.

DENTAL CARIES.

Under the title of "The Prevention of Dental Caries," two interesting papers have appeared from the pens of Dr. J. Sim Wallace and Dr. Stanley W. R. Colyer (*Dental Record,* June 1, 1911, and May 1, 1911).

The former author maintains that the "only thoroughly reliable method" of preventing dental caries is the natural or physiological one, and the solution of the problem is to be found in a dietary which leaves the mouth physiologically clean at the end of the meal. He considers that the dissemination of knowledge necessary for the prevention of dental caries must be mainly made through the medium of the general practitioner of medicine. Dr. Colyer, on his part, considers that the prevalence of dental caries is due to food changes, the two most important being the increased amount of soluble fermentable carbohydrate, and the constant introduction into the mouth of acid-fermenting organisms.

Several communications have appeared on the relation of bread to dental caries. Mr. T. G. Read (*Dental Record,* September 1 and August 1, 1911) considers that the use of the roller-milled flour is mainly responsible for the large amount of caries in the present day, while Dr. Wallace (*Proc. Royal Society of Medicine,* Odont. Sec., vol. iv) in a thoughtful paper considers that but little responsibility can be attributed to bread. His conclusions are—(1) That no farinaceous food-stuff in general use is less harmful than bread and butter; (2) that the varieties of bread make no appreciable difference in inducing caries, beyond the difference which the physical characters of the bread make in their detergent effects on the teeth, and (3) that crust is very greatly preferable to crumb in all varieties.

In reference to the treatment of extensive caries so often seen in children, Mr. J. F. Colyer (Annual Reports of Royal Dental Hospital of London) advocates the removal of all functionless deciduous and permanent teeth. He gives records of children of ages varying from four to ten years who have been left without any masticating area, and shows that they improve in health and increase in weight as a result of the removal of the sepsis. He even argues that the fear so often expressed that early removal of the deciduous teeth is extremely harmful to the growth of the jaw and the position of the permanent teeth is unfounded.

PERIODONTAL DISEASE.

The relationship of suppurative conditions of the periodontal membrane to general disease formed the theme of two interesting papers by Dr. W. Knowsley Sibley (*Lancet,* May 6, 1911) and Mr. C. Goulden (*Proc. Royal Society of Medicine,* Odont. Sec., vol. iv., p. 27). The former author drew attention to the frequent presence of periodontal disease with many forms of skin disease, while the latter author quoted some interesting cases, clearly demonstrating that the focus of infection in many intra-ocular conditions was distinctly traceable to the periodontal membrane. Under the title of "Pyorrhea Alveolaris: Its Interpretation," Mr. Hopewell-Smith (DENTAL COSMOS, April and September 1911), from a consideration of microscopical sections of cases, considers that the course of events is as follows: Atrophy of the bony socket and shrinkage, followed by a widening of the gingival margin and broadening and deepening of the pockets around the teeth, with hypoplasia of the periodontal membrane. If a pathogenic infection occurs, there is a lodgment of pyogenic bacteria in these already suitable pockets, and pyorrhea results, but may or may not be accompanied by gingivitis and the production of tartar. The author's conclusions differ considerably from those of others who have written on the morbid anatomy of the disease and from many of those possessing an extensive clinical experience.

IRREGULARITIES OF THE TEETH.

Mr. N. G. Bennett (Annual Reports of Royal Dental Hospital of London), in a paper on the "Etiology and Classification of Abnormal Development of the Jaw," considers that there is a danger at the present time of underestimating or entirely neglecting factors of inheritance. He emphasizes the importance of regarding deformities of the dental arch as a measure of defective bony growth. He states that it is obviously absurd, in conditions depriving the child of the proper incentive to growth, to think that the alveolar process alone will be affected, and he considers that the abnormal position of the permanent teeth and of the form of the enveloping alveolar process should be regarded as secondary results of inhibited growth of the body of the bone itself. In a paper on the "Relationship of Nasal Obstruction to Contracted Arches and Dental Irregularities," Mr. Rolleston Whittaker (*Dental Record*, July 1911) refers to the very important question of thyroid inadequacy, and suggests that there is a relationship between this and dental conditions.

HISTOLOGY OF THE TEETH.

An important advance in our knowledge of the ultimate termination of the nerves of the pulp has been scored by Mr. J. Howard Mummery (*Proc. Royal Society of Medicine*, Odont. Sec.). He has shown that from the nerve plexus under the odontoblasts, nerve fibrillæ pass directly into the dentinal tube along with the dentinal fibril. This observation must be regarded as one of the greatest importance in the study of the question of the sensitiveness of the dentin. Mr. Mummery's observations were made on sections which had been treated with iron and tannic acid, the procedure being briefly as follows: Sections are cut and stained with a 2 per cent. solution of perchlorid of iron, and then thoroughly washed; they are then treated with a 2 per cent. solution of tannic acid and watched under the microscope until they become sufficiently black.

PROSTHETIC DENTISTRY.

In connection with dental prosthesis, a valuable paper has been published by Mr. J. H. Badcock on "Sepsis and Prosthesis" (*British Dental Journal*, November 15th), in which he condemns the so-called collar crown, and advocates dentures designed in a way to leave the gingival margin free. The paper, which was read before the annual meeting of the British Dental Association, evoked a considerable amount of criticism, some of which was based on an inadequate knowledge of pathological processes in the mouth. Two other papers illustrating the scientific standpoint from which the problem of dental mechanics is being approached have been written, the one by Mr. H. J. Morris (*Proc. Royal Society of Medicine*, Odont. Sec., vol. iv) on the "Comparative Elasticity and Internal Structure of Cast and Rolled Gold Plates," and the other by Mr. D. M. Shaw (*Dental Record*, September) on the "Causes of Platinum Fractures in Porcelain Teeth."

MISCELLANEA.

Among communications of interest may be noted a series of articles on dental radiography which have appeared in *Items of Interest;* a paper by M. H. Cryer (*British Dental Journal*) on "Pathological Changes in the Jaw," and a suggestive article by W. Rushton (*Proc. Royal Society of Medicine*, Odont. Sec., vol. iv) on a "Possible Cause of Facial Asymmetry."

[*New York Medical Journal*, New York, February 24, 1912.]

PYORRHEA ALVEOLARIS: ITS IMPORTANCE IN CONSTITUTIONAL DISORDERS AND ITS TREATMENT BY VACCINE. (EDITORIAL.)

It is significant that pyorrhea alveolaris, which was relegated entirely to the dental profession a few years ago, should recently have been chosen as the subject for a thesis by a candidate for the degree of M.D. in the University of Dublin. Victor Green Best, in the Dublin *Journal of Medical Science* for February 1912, states that he chose this disease as his subject, because many other diseases, medical and surgical, are the outcome of it, because its seriousness is apt to be overlooked, and—what is of great importance—its progress can be checked and the condition permanently cured since the introduction of the vaccine treatment. This treatment may require to be carried out for a long period of time, and the vaccines should be prepared from the patient's own organisms, among which are likely to be found the streptococcus conglomeratus and diplo-streptococcus rheumaticus. There is no doubt in the author's mind of the connection between pyorrhea alveolaris, appendicitis, rheumatism, rheumatoid arthritis, and gastro-intestinal infections. Other conditions probably related are pernicious anemia, acute endocarditis, and nephritis, septic laryngitis and tracheitis, chronic gastritis, and sapremic symptoms. It seems that the medical profession might well study this not uncommon condition profoundly from the pathological viewpoint. Mere oral asepsis is not sufficiently prophylactic; there is a constitutional predisposition that solicits investigation.

We reproduce this editorial, not because it contains anything new for the dental practitioner who is familiar with current dental literature, but because it shows that the light is beginning to dawn in the medical camp, confirmatory of the fact that the dental profession has been on the correct road in its investigations and treatment of this disorder.

[*Correspondenz-blatt fuer Zahnaerzte*, Berlin, October 1911.]

REPLANTATION AND TRANSPLANTATION. By Professor Dr. Schroeder, Berlin.

By implanting pieces of various metals and ivory in the jaws of experimental animals, and observing the subsequent symptoms of resorption, the author finds that solid, nonabsorbable substances behave toward bone in the same way as toward connective soft tissue such as is present in the alveolus of an extracted tooth, viz, in some exceptionally favorable cases the foreign body is surrounded with a connective tissue sheath with little or no tendency to ossification. Substances of a character similar to that of the bone, however, behave differently if introduced into the body of the bone than if implanted into connective tissue; in the former case, either no resorption whatever takes place, or, if it does occur, new bone is formed simultaneously. In th latter case, the phenomena of resorption prevail, numerous granulations are formed, anc secondary neoformation of bone occurs, thougl not necessarily. From these findings it appears that the implantation of roots consisting of a material foreign to bone offers n prospect of real and lasting success, no matter whether the artificial root is introducec into an alveolus covered with periosteum o directly into the bone. Ivory, on the othe hand, is more successful, as it enters into firn union with the bone and is resorbed eithe not at all or only slowly. The author report very satisfactory results from ivory roots implanted in empty alveoli. To prevent th possibility of absorption, he strengthened th ivory root with gold bars embedded in th root.

The author's technique of implantation i as follows: After extraction of the tootl to be replaced, the empty alveolus is clearec of periosteum with a bur and slightly enlarged while the local anesthesia, induced fo the extraction, still lasts. With a cone o wax modeled around an orange-wood stick, a impression of the prepared alveolus is taker and with the aid of this impression, a duplicate of the root is carved in ivory, this roo to fit firmly into the alveolus and to reacl only to the bony alveolar margin. A crow is then fitted to the artificial root, either b means of a pivot or preferably a platinur tube reaching to the apex of the root. Thi platinum tube may be perforated in severa places by means of a round bur, in order t offer the growing osteogenous tissue as man places of retention as possible.

The article is illustrated by a series o instructive and clear radiographs and sections.

[*Journal of the American Medical Association*, Chicago, January 20, 1912.]

THE TECHNIQUE AND RESULTS O DEEP INJECTIONS OF ALCOHOL FO TRIFACIAL NEURALGIA. By Dr. H. T Patrick, Chicago.

After describing the technique, indication for, landmarks, and anatomical considerations in this operation, the author summarizes as follows:

For the very old, the very feeble, and fo patients with grave organic disease, deep in jection of alcohol is incomparably the best treatment. It is practically without danger, without shock, and almost without any inconvenience. No anesthetic is needed, and the majority of such patients may be kept in comfort until old age or intercurrent disease brings the end. Save in the hands of a few exceptionally experienced and skilful operators, the Gasserian operation is a dangerous and somewhat uncertain procedure, certainly a capital operation. Nevertheless, when the sufferer from tic douloureux is young and vigorous, with a prospect of living many years, it would be better for him to have the radical operation done at once, as in all probability eventually he will come to it. There is a large class of middle-aged patients in good or fairly good health for whom a choice of treatment is not so simple. Concerning these, the following considerations are submitted: In addition to expressing his own predilection, the operator should make a plain statement to the patient of the different methods, their probable results and hazards. The prerogative of choice lies with the patient. Injections of alcohol make subsequent and more radical operations no more difficult or dangerous. When the patient is exhausted by long-continued pain and loss of sleep and is weak from lack of food, the temporary relief afforded by alcohol injections enables him to recuperate and get into condition for operation. Occasionally immediate relief is demanded, if possible. Deep injections of alcohol are, of course, contra-indicated in migraine, sinus disease, alveolar abscess, brain tumor, brain abscess, syphilitic periostitis, brain syphilis, glaucoma, pressure of a septal spur, or softening in the optic thalamus.

[*Zahnaerztliche Rundschau*, Berlin, January 14, 1912.]

CONTRIBUTION TO THE TREATMENT OF PERFORATED TEETH. By Dr. C. J. Grawinkel.

The author describes a case in which the patient presented a lower left molar which had been crowned without previous scientific preparation or root-canal filling, and in which the floor of the pulp cavity had been perforated. After removing the hypertrophied soft tissue which had invaded the base of the perforated pulp chamber, and clearing up the putrescent condition of the root-canals, various unsuccessful efforts were made to bridge the perforation and save the roots for crowning. The cavity was carefully cleansed with hydrogen dioxid and dried with pellets of absorbent cotton, but without the hot-air syringe, in order to avoid any possible infection from that source. Then a gold foil cylinder was pressed into a square piece, annealed over a flame, and carefully laid on the bottom of the cavity. The edges were gently pressed down, care being taken not to exert any pressure on the perforated portion. The pulp chamber was filled one-half with thinly mixed calxin, and, after this had hardened, a protective layer of Harvard cement inserted. After a week, the formerly refractory tooth could be prepared for a shell crown, no further complications ensuing.

[*L'Odontologie*, Paris, December 30, 1911.]

ON THE FIXATION OF BRIDGES WITH GUTTA-PERCHA. By Dr. Zimmermann, Paris.

The author gives a curious and quite forcible illustration of the advantage of seating fixed bridges by means of gutta-percha, which material allows of the removal of the appliances without destroying the same. He had inserted a bridge in a man of middle years, replacing the upper left second bicuspid and first molar, the abutments consisting in two shell crowns on the upper first bicuspid and second molar. The history in regard to the manner in which the two replaced teeth had been lost was not quite clear, and to the patient's and operator's surprise two months after the insertion of the bridge a second bicuspid, which had been unduly retained, began to erupt. Since the bridge had been seated with gutta-percha, it was easy to remove it without distortion, as soon as the erupting second bicuspid had erupted so far as to come in contact with the body of the bridge. The shell crowns were separated from the dummies and replaced on their respective abutment teeth with gutta-percha. After the second bicuspid was fully erupted, a superficial cavity was prepared across its masticating surface, a gold inlay cast and, together with the first molar dummy, soldered to the two abutment shell crowns. The new bridge was reseated without the necessity having arisen of destroying and remaking the shell crown abutments and dummy, which would have been inevitable had the original bridge been inserted with cement.

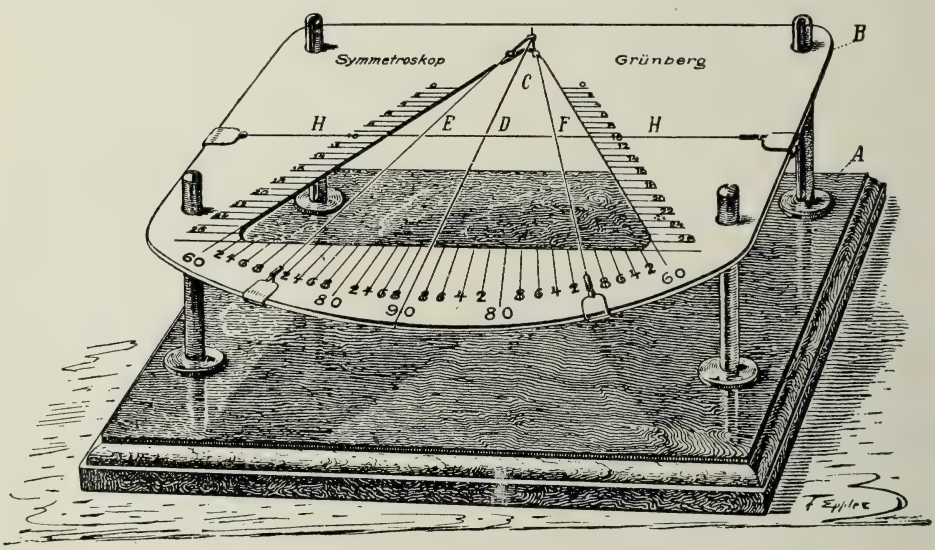
[*Oesterreichisch-Ungarische Vierteljahrsschrift fuer Zahnheilkunde,* Vienna, No. 2, 1911.]

THE SYMMETROSCOPE: AN APPARATUS FOR MEASURING THE SYMMETRY OR ASYMMETRY OF DENTAL ARCHES.

By Dr. Joseph Gruenberg, Berlin.

Every practitioner of orthodontia who accepts Angle's classification realizes that in examining cases the relations of the teeth in both arches to one another furnish the best indications as to the condition of the denture and the plan of treatment. In cases where teeth are missing on one or both sides, or where teeth are in faulty alignment, it is important to determine the direction and the manner of deviation of the remaining teeth before definitely assigning the case to a certain class. In almost all cases of faulty occlusion, it must be ascertained whether the teeth on both sides in each arch occupy the same plane or not, meaning thereby the vertical line drawn from the apex of the arch In cases where a deviation of the teeth has taken place only on one side, it is always essential to determine how this deviation has been brought about, whether it has taken place in a mesial or a distal direction, whether the teeth in moving have impinged upon one another, and whether and how far the individual teeth have deviated buccally or lingually.

Fig. 1.



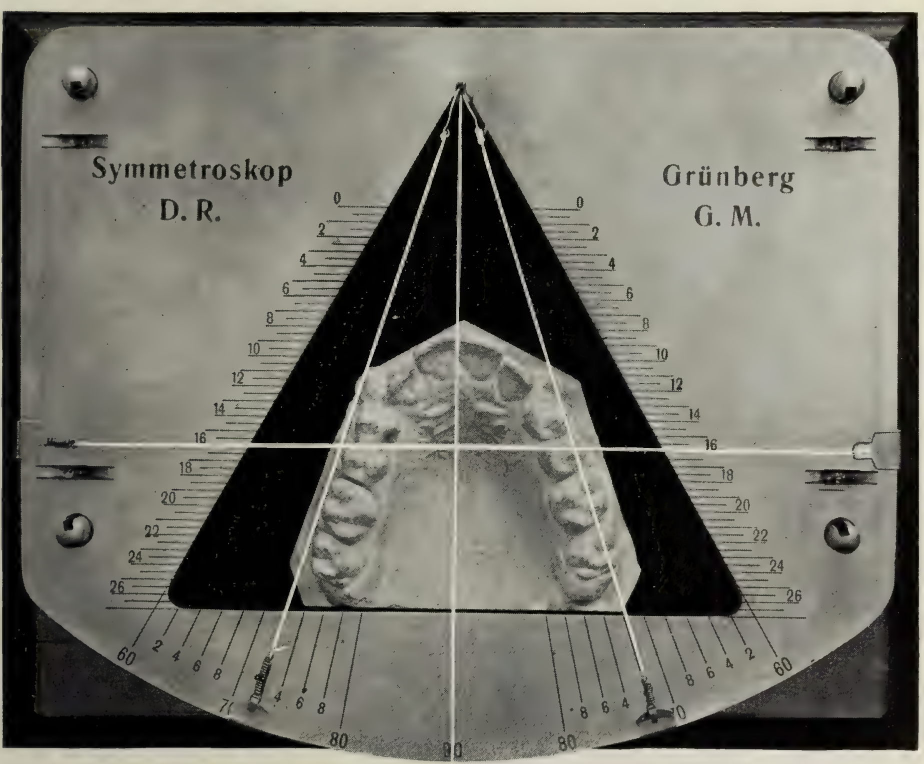
In regulated cases also, and in determining the normality of dentures, the symmetry or asymmetry of the halves of the dental arch must be determined. For this purpose, operators generally content themselves with a superficial examination either of the mouth or of plaster casts thereof, thereby allowing wide play to their own personal judgment.

In his efforts to design a mathematically accurate instrument for determining symmetry or asymmetry in a dental arch, and to eliminate the personal equation, Gruenberg has been induced to construct the "symmetroscope" (Fig. 1), consisting of a base A, with four grooved posts which permit of raising, lowering, and fixing the plate B at any desired height.

The plaster cast of the case to be examined is placed under the triangular aperture C in the plate B, which is amply large enough for models of any size. Of the three guide threads strung in the perpendicular direction of the triangle, the central string D remains stable at 90 degrees, while the two other strings E and F can be adjusted at any desired angle. The cast is placed under the triangle, so that the perpendicular string D comes to lie between the central incisors, and the plate B is lowered so that the strings come in contact with the teeth. The strings E and F are then adjusted at equal angles, and by observing whether or not they intersect homologous points of homologous teeth, it is at once ascertained whether the teeth on both sides are situated at the same angle, or whether any of them have deviated lingually or buccally. The horizontal string H is moved backward or forward over the graduated lines. If it intersects homologous points in every portion of the cast, then the arch is symmetrical. Any irregularities present will become evident at a glance at these three guide strings, and it can be determined accurately whether a deviation mesially, distally, buccally, or lingually has taken place. For the purpose of diagnosis and control of the advance made in treatment and of the success obtained in retention, this apparatus seems most practical and accurate.

A valuable supplement to this apparatus was contrived in the form of a transparent measuring plate, with triangular graduation, based on the same principle as the symmetroscope. The author finds this contrivance to be valuable in studying the illustrations of cases of malocclusion as published in textbooks and journals, showing the conditions before and after regulative treatment, also for determining the center of the bar arch, for bending it and examining its symmetrical or asymmetrical position, by simply laying the celluloid measuring plate on the study model. Absolutely accurate results such as are obtained by the symmetroscope cannot, however, be expected from this purely accessory measuring plate.

FIG. 2.



[*Lancet*, London, January 27, 1912.]

ALCOHOL INJECTION OF THE GASSERIAN GANGLION. BY DR. W. HARRIS.

Harris has employed alcohol injections in the treatment of trifacial neuralgia for several years, and has treated some ninety cases during that time, with greater or less relief in all but three cases. In the majority, the relief was of at least one year's duration. He is emphatic in the view that total absence of relief implies that the nerve was not injected, for strong alcohol injected into any nerve trunk destroys the fibers almost instantly. The procedure he now describes is an advance upon his former one in that he seeks not only to destroy a single or at most two divisions of the nerve, but to destroy the ganglion itself. He reserves decision as to whether it is advisable to destroy the ganglion in those cases in which the neuralgia does not affect the lower division of the nerve, for this would mean permanent loss of sensation over the corresponding side of the tongue; in other cases, however, and particularly in the severe and intractable ones, he advises the destruction of the ganglion. This he accomplishes by passing the needle through the foramen ovale under a local or general anesthetic. He chooses a point on or slightly below a line joining the ala nasi with the incisor notch; when the teeth are in position, this line usually corresponds to the lower border of the sigmoid notch on the lower jaw. He then directs the needle fairly well upward, until the lips of the foramen ovale are felt with its point. This is then entered, and at once the nerve is injected at this point with 1.5 cc. of ninety per cent. alcohol. If no general anesthetic is given, he precedes this by an injection of six or seven minims of two per cent. eucain to make the alcoholic injection practically painless. If the nerve has been successfully injected, there will develop at once deep anesthesia of the lower lip and chin. He then passes the needle through the foramen, without using force. There is considerable resistance to the injection if the point of the needle is within the nerve tissue. Then 1 to 1.5 cc. more of the alcohol is to be injected directly into the ganglion, a few drops at a time, at intervals of not less than two minutes, testing, meanwhile, the sensation of the cheek and forehead with a blunt pin. When neither the point nor the head of the pin is any longer perceived, it is probable that sufficient alcohol has been injected, and the needle can be slowly withdrawn. Even after this, the anesthesia will probably fade in an hour or so, and by the next day tactile sensation may be fair on the forehead and below the eye, with a normal conjunctival reflex. If this is the case, there need be no fear of the development of keratitis. There is a subsequent recovery of the motor powers of the jaw muscles, and this is explained by the fact that the motor branch of the fifth nerve has no connection with the Gasserian ganglion. The results of this operation are as good, if not even better, than those from the complete resection of the ganglion, and the danger is *nil* as compared to the dangers of that procedure.

[*New York Medical Journal*, New Jork, February 24, 1912.]

THE OFFICE ANESTHETIC FOR SMALL SURGERY—NITROUS OXID AND AIR—SELF-ADMINISTERED. By Dr. A. E. Guedel, Indianapolis.

General anesthesia for small office surgery is often an annoying problem. The average office is not equipped with a recovery room, and following an ether or chloroform anesthesia all other office work must wait until the patient recovers consciousness. The writer reports results obtained in small office surgery with nitrous oxid and definite quantities of atmospheric air administered by the patient himself. For complete narcosis the safety of this method is almost absolute, the action of the gas itself being a safeguard against accidents. The patient simply holds the inhaler to his nose and breathes. When complete unconsciousness supervenes, the inhaler either falls or is removed by the concurrent anoxemic muscular spasm, and recovery soon occurs. The available surgical anesthesia thus secured lasts usually from ten to twenty seconds, which allows ample time to complete various short operations. Nausea and depression are extremely rare, even though a meal has just been taken. Patients as a rule have not the fear of such an anesthetic that is often manifest when the inhaler is held by another, and indeed, returning patients often seem to anticipate pleasantly the exhilarating effect of the gas. To secure this short complete narcosis, about 10 per cent. of air is admitted with the gas, which, although it is less rapid in its action, gives a slightly longer available anesthesia than when pure gas is used.

Analgesia consists of a pleasant sensation of numbness of the entire body, resembling closely alcoholic intoxication just short of narcosis. In this analgetic state, sensitivity to pain is not entirely abolished, but is lowered to a surprising degree. The patient holds the inhaler to his nose, and breathes a mixture of about seventy-five per cent. nitrous oxid with twenty-five per cent. air, the depth and duration of this state depending entirely upon the quantity of air admitted. The percentage of air differs somewhat in various individuals. The patient is at all times in full possession of his faculties and able to follow the directions of the operator, unless complete narcosis is permitted by insufficient air-supply. The state of analgesia may be maintained indefinitely without any unpleasant results. The admixture of oxygen is expensive and inconvenient to handle, and not necessary for the production of analgesia. Occasionally it is desirable to combine narcosis and analgesia as described above. Results can be obtained with any nitrous oxid and air apparatus.

[*Bulletin du Syndicat des Chirurgiens-Dentistes de France*, Paris, February 1912.]

MAKING RING MATRICES FOR PLASTIC FILLINGS. By Dr. Boissinot, Bordeaux.

In order to facilitate the firm packing of plastic fillings, in approximal cavities in posterior teeth especially, the author takes wire measurements of the cervical circumferences of extracted teeth, and solders a number of German silver rings, some slightly larger, some smaller than the measurements obtained for each class of teeth. A wooden gage-stick, on which the various tooth circumferences are premodeled in terrace-like succession, will greatly facilitate the work. The rings for each class of teeth are put away in separate boxes, and tried in the mouth as cases present. They will readily adapt themselves to the shape of the tooth under treatment, and can be festooned in conformity with individual teeth. If the shape of the tooth is pronouncedly conical near the cervical margin, a small wedge or semicircle of wood may be inserted to fill up the angle between the tooth and the gum surface. After completion and hardening of the filling, the ring can be removed with a few cuts of a suitable bur. These rings are very practical for keeping blood or saliva from the cavity while the filling is being inserted.

[*Quarterly Journal of Medicine*, London, October 5, 1911.]

FACTORS IN ETIOLOGY OF ORAL CARCINOMA. By Dr. C. Singer.

It is thought by Singer that carcinoma beginning in the oral mucous membrane may form a separate clinical entity, in which carcinoma of the esophagus should perhaps be included, but from which epithelioma of the lip should probably be excluded. The cases forming this oral group of cancer do not, as a class, form an average sample of the general population. They appear to differ from the general population in the following particulars: (1) There is an overwhelming preponderance of males over females among them. (2) A large percentage have suffered from syphilis, often of very severe type. (3) Many are stout, heavy, plethoric men, of the type well illustrated in actual life by our police and soldiers. They are most often men of exceptionally robust previous health. (4) That their metabolism is probably not that of the normal population is suggested by the fact that a considerable percentage of them have suffered more or less severely with gout, usually of a typical and easily recognizable form. (5) Although apparently healthy, except as regards the local disease and the effects of syphilis and gout, these patients exhibit evidence of renal interstitial change and arterial degeneration. The liability to oral carcinoma at various ages differs from that of cancer of other regions in a special manner; this difference may be graphically expressed in death-rate curves which are characteristic of this malady, and are typified by the curves for cancer of the tongue. It is suggested that these peculiarities may be in part explained by assuming that the earlier cases are more frequently of syphilitic origin, while the later have other associations, among which gout is to be reckoned. Aneurysm and certain vascular diseases present certain analogies to some types of oral carcinoma, especially as regards age distribution, and it seems not unlikely that these analogies may be related to similar etiologic factors.

PERISCOPE.

Cleaning Mirrors.—Whiting, mixed with alcohol to the consistence of cream, is excellent for polishing mirrors and large surfaces of glass.—*Dental Brief.*

Paraffin Injection for Disfigurement Following Dental Abscess.—The deep, open, cone-shaped scar left by abscess in the socket of a lower tooth constitutes a great disfigurement, which, however, may be completely relieved by the skilful use of a cold paraffin injection.—*Med. Times*, per *Dental Surgeon.*

Polishing Fillings with Sandpaper Disks.—In polishing fillings with sandpaper disks, both sides of the disks are first run over a piece of dry soap. It is astonishing how easily the disks pass between the teeth, and how readily they remove any excess of gold.—*Dental Digest*, per *Deutsche Zahnaerztliche Zeitung.*

Post-Anesthesia Acidosis.—After all general anesthesia, it is good procedure to let the patient drink repeatedly, at intervals, a glass of water containing a dram of sodium bicarbonate. If this is vomited, it serves as a good gastric lavage; if retained, it tends to forestall acid intoxication.—S. T. POPE, *Journ. of Amer. Med. Association.*

Separating Plaster Models from a Compound Impression.—In separating plaster models from a compound impression, the impression is heated in hot water, and then placed under the cold-water faucet for two or three seconds. The model can then be removed from the impression without leaving a particle of compound material sticking thereto.—*New Jersey Dental Journal.*

Small Stones for Preparing Cavity Margins.—Cavity margins should be prepared with small stones as much as possible. This preparation is more agreeable for the patient and the margins become much smoother. By frequent application of a magnifying glass, the operator can satisfy himself as to their perfect smoothness.—*Tijdschrift voor Tandheelkunde*, per *Deutsche Zahnaerztliche Zeitung.*

Protecting the Gingival Tissue in Grinding Down Roots of Anterior Teeth.—If the root of an anterior tooth is to be prepared for a Logan crown, after the tooth has been ground down to the gingival border, a small ring of orange-wood is whittled at one end to fit around the root, and by its use the gingival tissue is pressed away so that the root can be shaped and ground below the gum margin without tearing and mutilating this tissue.—*Le Laboratoire et le Progrès Dentaire.*

Reattaching One or More Teeth to a Vulcanite Denture.—The teeth are waxed in position upon the denture, and an impression is taken with modeling compound of the teeth to be replaced and one or more teeth adjoining the wax are removed, and rubber is packed in the ordinary manner, using the impression as a matrix to hold the teeth in position. The matrix is then removed, and the case flasked with one mix of plaster and vulcanized.—W. F. WILSON, *Dental Summary.*

Obtaining a Perfect Joint Between Facing and Backing in a Richmond Crown.—In making a Richmond crown, a perfect joint between the band and the facing can be secured in the following way: The facing is ground to place in the usual way. The backing is burnished over the floor of the facing so that it just appears on the labial wall, which has been given a very slight bevel with a stone. The solder will then flow under the facing and insure a perfect joint.—*New Jersey Dental Journal.*

Lubricating Oil for Dental Engines.—One part of neatsfoot oil is mixed with two parts of benzine, and the solution kept in a temperature of from 2° to 3° C. for twenty-four hours. The clear portion of the mixture is then poured off, and the benzine evaporated in a water-bath. After the residue has cooled, one twentieth part of its weight of finely pulverized sodium bicarbonate is added, shaken, and left standing for several days. When the oil has cleared, it is poured off, poured into small bottles, and firmly corked.—*Journ. Dentaire Belge.*

Roughening Posts or Tubes Before Cementing in Root-canals.—It is not necessary to notch posts or tubes with cutters or pliers in order to get a rough surface for anchorage in the cement. A fine rough surface can be obtained by placing the post—or tube, with a piece of wire inside it—upon a rubber block and beating it all around with a coarse file. This in no way interferes with the strength of the post or tube, as is the case if notches are cut.—W. A. HARROP, *Dental Record.*

Making a Clear Shellac Solution.—To make a clear shellac solution, first an ordinary alcoholic solution of shellac is made. A few drops of benzine are added, and the mixture is well shaken. After two or three days the liquid is separated into two distinct layers, the upper alcoholic layer consisting of an entirely clear, dark red fluid, while the lower represents a mottled mixture of impurities. The clear solution can then be poured or drawn off.—*Dental Digest,* per *Deutsche Zahnaerztliche Zeitung.*

Repairing Vulcanite Dentures.—A perfect union can be obtained between old and new rubber, even if the surface of the old rubber is highly polished, by the following simple method: Without cutting the usual dovetails for retention, the surfaces to which new rubber is to be attached are covered with a thin coat of crude petroleum. The case is flasked in the ordinary way, pressed and vulcanized, when perfect and inseparable union between the two layers of rubber will be found to have taken place. This process is of value in many cases of repair work, in strengthening a weak or thin plate, in adding supplemental portions to a plate, dry packing, etc.—C. W. F. HOLBROOK, *Dental Scrap-Book.*

Sources of Invasion in Tuberculosis of the Maxillæ.—Three roads of invasion of the maxillæ by tubercle bacilli may be distinguished: First, the tubercular infection may spread from the mucous membrane and the gingival tissue to the maxillary bones; second, from a carious tooth with decomposing pulp chronic osteitis and periostitis may develop which are either primarily of tuberculous nature or subsequently become tuberculous. As in tuberculosis of other bony portions of the body, the infection may originate in the bones of the maxillæ without the presence and spreading of a tubercular process in the mouth, the oral mucous membrane, or the teeth.—J. ZILZ, *Ash's Wiener Viertel-jahrs-Fachblatt.*

Drainage of Suppurated Antrum of Highmore.—The antrum should be punctured by a trocar and a cannula passed through the middle meatus or below the inferior turbinal, and irrigated with warm normal saline solution or boric lotion; the necessary manipulations can only be carried out with safety and a minimum of discomfort to the patient by those skilled in intranasal surgery. The irrigations may have to be repeated daily for a week or ten days. When a diseased tooth is the cause of trouble it should be removed, the alveolus perforated, and a temporary alveolar plug inserted. The antrum can then be irrigated twice daily until the inflammation has subsided, when the alveolar passage may be allowed to close. —H. TILLEY, *Lancet.*

The Canine as Criterion Tooth in Orthodontia.—In opposition to Angle's views in regard to the permanent first molar being the criterion tooth of occlusion, Dr. Pierre Robin before the last French Stomatological Congress claimed that the canine is the pre-eminent tooth, and its loss causes esthetic, mechanical, and physiological modifications. The eruption of the permanent canine takes place in the same relationship as that of the deciduous. Generally, these teeth are the last teeth to fall out; they should never be extracted. Even in case of delayed eruption, the canine may be regarded as the criterion tooth, in that the deciduous canine persists, and when it disappears, the distal border of the permanent lateral incisor remains as an invariable mark.—*Dental Surgeon.*

Gilding Without Galvanic Battery.—If appliances that have been gold-plated before, but have become worn, are to be restored to better appearance, one of the following two methods may be applied by which a very thin gold coating may be produced: A strip of zinc plate is polished and the object to be gilded is laid upon it, or wrapped with clean zinc wire, and immersed into a warm bath of the following composition: Water, 1000 gm.; phosphate of soda, 50 gm.; neutral sulfite of soda, 15 gm.; 100 per cent. of potassium cyanid, 6 gm.; trichlorid of gold, 1.5 gm.

Or the objects may be immersed for a moment in a boiling solution of the following composition: Water, 1000 gm.; phosphate of soda, 6 gm.; caustic soda, 1 gm.; neutral sulfite of soda, 3 gm.; potassium cyanid, 10 gm.; trichlorid of gold, 0.6 gm. The objects are removed immediately after immersion, and rinsed in running water.—C. HERBER, *Zahnaerztliche Rundschau.*

Allaying Pain in Acute Pulpitis.—In acute pulpitis, even the most severe pain can be eradicated within half an hour by the following method: The cavity is first cleansed mechanically and then wiped with a pellet of cotton saturated in 95 per cent. alcohol, this to be followed by an application of concentrated carbolic acid. A small pellet of cotton is then placed in the bottom of the cavity, after having been saturated with a mixture of 20 grams of compound tincture of benzoin and 1 gram of novocain. The cavity is then sealed with a cotton dressing covered with collodion or sandarac varnish. Before retiring, as a prophylactic measure, one or two tablets of trigemin are given, which is a combination of butyl chloral and pyramidon, and an excellent hypnotic and analgesic in pain of the trigeminal nerve.—*L'Odontologie*, per *Deutsche Zahnaerztliche Zeitung.*

Vulcanite Plate of Black Rubber with Pink Rubber Veneer, Made in One Vulcanization.—The plate is waxed up in the usual way, but of a thickness two-thirds of that which the finished plate is to have. The case is then flasked, and the counter-die is poured in plaster. After this has hardened, it is removed and marked as No. 1; then an additional layer of wax is added to the invested plate, so that it is of slightly greater thickness than the polished plate will be, and a second counter-die is poured. After the wax has been boiled out and the case well heated, black rubber is packed in small pieces, and rubber vents are cut in the counter-die No. 1, which is covered with a sheet of muslin. The flask is then closed and pressed, when the black rubber will spread uniformly. All excess of black rubber is removed, and the second thickness of rubber is provided for by packing pink rubber. The case is then ready for vulcanization.—*Le Laboratoire et le Progrès Dentaire.*

Removable Pivot Tooth.—The root-canal is made square, not round, in order to prevent rotation of the pivot. After preparing the root, a square box is made corresponding with the dimensions of the square root-canal, the end to be allowed to protrude above the root surface. A root-cap is then made with a square aperture to allow for the passage of the root-box, which is soldered to the cap. After cementing the box and cap to place, a suitable pivot tooth with square pivot is selected, the box in the root-canal is warmed by introducing a heated instrument, the pivot is also heated, covered with a suitably thick solution of gutta-percha, and pivot and crown are quickly pressed to place. If it should become necessary to remove the pivot tooth, a hot instrument is held over the center of the crown; as the metal pivot is a good conductor of heat, the gutta-percha is softened, and the pivot tooth can be easily removed.—S. L. Kraemmer, *Zeitschrift fuer Zahntechnik.*

Causes and Prophylaxis of Pain Arising after Extractions under Local Anesthesia.—The causes for post-operative pain are employment of an anesthetic solution in too high concentration or too large a quantity, the presence of an abscess or cyst, the use of a non-sterile solution, and subsequent infection of the wound by lack of care. The therapeutic measures indicated consist in the use of a novocain solution not exceeding 2 per cent., with one or two drops of a 1:1000 suprarenin or adrenalin solution. If an abscess or cyst is present, the injection should always be made peripherally—never within the abscessed or cystic area. The anesthetic solution must be well sterilized, and vigorous antiseptic washings of the wound must be applied following an extraction. In extraction wounds the author always introduces a tampon of cotton saturated in a 2 per cent. solution of carbolic acid, or applies a spray of some antiseptic in powder form. To prevent neuralgia, internal doses of from 0.3 to 0.5 centigram of pyramidon are administered.—S. Calbé, *Revue de Stomatologie.*

Cast Jointed Logan Crown.—The jointed Logan crown is by no means new, but is perhaps being used more since the advent of casting. It is especially advantageous in cases where the tooth structure has been lost by caries or otherwise to an extensive degree beneath the gum line. After the tooth-root has been prepared as in cases for Logan crowns, a removable pin crown is selected with due regard to size, shaped and ground to a joint beneath the gum line on the labial surface only. Then by the use of an iridio-platinum pin the surplus wax is removed and trimmed away, the two parts are joined with inlay wax and pressed to place against the tooth root, replaced, and wax is burnished around the tooth root. The crown can now be separated from the pin and wax and the latter invested and cast, preferably by the use of pure gold.

This method gives increased strength to the pin as well as better adaptation to the root surface; the parts can now be united with cement, and when finished, the crown is ready for setting.—C. J. Burris, *Dental Summary.*

Supra-occlusion of Molars in Open-bite Malocclusion.—In all cases of the typical form of open-bite malocclusion there is supra-occlusion of the molars, which should receive more attention than is generally conceded, since it is really the cause of the infra-occlusion. It is directly traceable to prolonged retention of the deciduous second molars.

The germs of the first permanent molars are the first permanent tooth germs formed, and they are as a rule the first permanent teeth to erupt, and are the largest and strongest. These first permanent molars determine the length of bite; that is, the length of overbite of the upper anterior teeth, erupting as they do just back of the second deciduous molars at the age of six years, and becoming firmly locked before the loss of the deciduous molars.

These teeth—the first permanent molars—serve as props to hold the jaws apart while the deciduous molars are being shed, and their permanent successors, the bicuspids, are erupted into place and interlock.—VAN B. DALTON, *Items of Interest.*

Split Roots.—Not infrequently we find teeth which have become split by violence of some form, and which, unless some mechanical interference be instituted, have lost their usefulness. This most frequently occurs in badly broken-down filled or unfilled teeth, as for instance in bicuspids and molars with compound cavities extending mesio-distally across the masticating surface. This condition is also often found in molars which are not at all carious, and have even intact pulps. In such cases, the pulp must of course be removed and the roots filled. For the repair of such cases, the following method is suggested: If an upper second molar, for instance, is split mesio-distally between the buccal roots on one side and the lingual root on the other, the tooth is ground to shape as for a crown, and a hole drilled through from the buccal surface to the palatal side. The drill can be made from an ordinary bur with the shank cut down to follow the drill and permit it to go through. The drill hole is countersunk on each side to receive the head and nut of the rod. This little rod is easily made by cutting a piece of platinum wire, No. 20, of the required length, and flowing a little ball of gold solder on one end for a head. The other end is threaded to receive a Bryant's bridge repair nut.

The tools used for this work are of the Bryant's bridge repair set. The little rod is slipped through the drill hole from the palatal side and the nut screwed to place, drawing the two sides of the split tooth tightly together. No attempt should be made to put any filling material in the crack, but it should be thoroughly syringed with hydrogen dioxid before being drawn together. It can then be filled with cement and amalgam, and the nut and head of the rod trimmed flush with the outline of the tooth.—D. D. ATKINSON, *Dental Brief.*

The Uses of the Radiograph in Dentistry.—The manifold uses to which the radiograph may be put in dental practice may be gleaned from the following summary: (1) In cases of delayed eruption, to determine the presence or absence of the unerupted teeth. (2) In cases where deciduous teeth are retained long after the time when they should have been shed, to learn if the succedaneous teeth be present. (3) To learn if the roots of children's teeth be fully formed. (4) To determine whether a tooth be one of the deciduous or the permanent set. (5) To determine when to extract deciduous teeth. (6) To show the orthodontist that he may move the coming permanent teeth by moving the deciduous ones. (7) To observe moving teeth. (8) In cases of supernumerary teeth. (9) In cases of impacted teeth as an aid in extraction. (10) To determine the number of canals in some teeth. (11) As an aid in filling the canals of teeth with large apical foramina. (12) To learn if canals are open and enlarged to the apex before filling and to observe the canal filling after the operation. (13) To determine whether an opening leading from a pulp-chamber be a canal or a perforation. (14) In cases of pulp-stones (nodules). (15) In cases of secondary dentin being deposited and pinching the pulp. (16) To learn if the filling in the crown encroaches on the pulp. (17) In cases of teeth with large metal fillings or shell crowns which do not respond to the cold test, to learn if the canals are filled. (18) To learn if apical sensitiveness is due to a large apical foramen or an unremoved, undevitalized remnant of pulp. (19) In case of chronic pericementitis—"lame tooth." (20) In cases of alveolar abscess to determine which tooth is responsible for the abscess. (21) In cases of alveolar abscess to determine the extent of the destruction of tissue—bony and tooth. (22) In cases of alveolar abscess to learn how many teeth are involved. (23) In cases of abscess of multi-rooted teeth to learn at the apex of which root the abscess exists. (24) In cases of abscesses of crowned teeth to learn whether the canals are properly filled. (25)

As an aid in differential diagnosis between alveolar abscess and pyorrhea alveolaris. (26) To observe destruction of tissue due to pyorrhea alveolaris. (27) In cases of pericemental abscess. (28) In cases of persistent suppuration which does not yield to the usual treatment—in fact in all cases that do not yield promptly to the usual course of treatment. (29) To observe the course of a fistulous tract. (30) To observe the field of operation before and after apicoectomy. (31) To locate foreign bodies, such as a broach in the root-canal or tissues at the apex of a tooth; a piece of wooden toothpick in the pericemental membrane, etc. (32) To determine the presence or absence of a bit of root embedded in the gum tissue. (33) To diagnose fracture of a root. (34) To observe the size and shape of the roots of teeth to be used in crown and bridge work. (35) As an aid and safeguard when enlarging canals for posts. (36) To examine bridges about which there is an inflammation. (37) To observe the field before constructing a bridge. (38) To observe planted teeth. (39) In cases of cementoma. (40) In cases of bone "whorls." (41) To locate stones—calculi—in the salivary ducts or glands. (42) In cases of bone cysts. (43) In cases of dentigerous cysts. (44) In cases of tumor, benign or malignant. (45) To observe anomalous conditions, such as the fusion of the roots of two teeth, for example. (46) To observe the location and extent of a necrotic or carious condition of bone. (47) To diagnose antral empyema. (48) To observe size, shape, and location of the antrum as an aid in opening into it. (49) To locate foreign bodies, such as tooth-roots or broaches, in the antrum. (50) To observe cases of luxation before and after reduction. (51) In cases of fracture of the jaw before and after reduction. (52) In cases of ankylosis of the temporo-mandibular articulation and the joint formed by the tooth in the jaw. (53) To observe the field of operation before and after resection of the mandible—the operation for bad cases of prognathism. (54) In all cases of facial neuralgia with an obscure etiology. (55) To observe the inferior dental canal. (56) In cases of Ludwig's angina. (57) In cases of facial gesticulatory tic—spasmodic twitching of a set of the facial muscles. (58) In cases of periodic headaches. (59) In cases of insomnia, neurasthenia, insanity, and kindred nervous disorders. (60) To allay the fears of a hypochondriac. (61) In cases where the patient cannot open the mouth wide enough for an ocular examination. (62) In research work to study anatomy, the development of teeth, action of bismuth paste, bone production and destruction, changes occurring in the temporo-mandibular articulation when jumping the bite, blood supply to parts, resorption of teeth and the causes for it, etc. (63) As a record of work accomplished.—H. R. ROPER, *Items of Interest.*

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HINTS, QUERIES, AND COMMENTS.

A PERFECTLY FITTING PORCELAIN INLAY.

A PORCELAIN inlay which fits the cavity exactly and leaves a minimized cement line may be constructed in the following manner:

An impression of the cavity is taken with dental lac, embedded in moldine in the cup of a swaging outfit, and the gold or platinum matrix is swaged in the impression. Oiling the impression first makes the removal of the swaged matrix easier.

When the foil is perfectly adapted it is covered with a layer of investment compound, which is allowed to harden. When the investment compound has thoroughly hardened, the matrix, together with its backing of investment compound, is removed from the cup and invested in the regular way, in one of the nickel trays used in porcelain work.

The advantages of this method are—(1) A model is unnecessary, and time is saved; (2) Thick foil may be used, lessening the chances of distortion in baking; (3) The matrix cannot be distorted in removal from the model or when invested in the tray; (4) The inlay fits the cavity perfectly.

C. M. TORRANCE, D.D.S.

Frankfort-on-Main, Germany.

SANITARY MATRIX BANDS OF TRANSPARENT CELLULOID.

A THIN transparent celluloid strip, 5¾ inches long, ½ inch wide, and 0.005 inch thick, is procured. Using an Ivory steel matrix band as a pattern, with a pair of curved crown scissors from one to four bands are cut from the celluloid strip. If several celluloid bands are cut at once, the rough edges should be smoothed off afterward with a sandpaper disk. After a little practice the operator will be able to cut a band readily which will suit each individual case. The holes for the retainer are made with a rubber-dam punch. A matrix prepared in this way offers several advantages over an ordinary steel matrix band. Celluloid matrix bands are sanitary, as they are used for but one operation. Their transparency enables the operator to see the margins of the filling while the matrix is in place. They are thin and pliable, and therefore adapt themselves easily to the cervical margin in the interproximal space. They are inexpensive, and last, but not least, they are easily removed, thereby preserving the contact point of the filling. A trial will convince the operator of the merits of these matrices.

EDWARD JACOB, D.D.S.

East Chicago, Ind.

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OBITUARY.

WILLIAM HENRY GILBERT.

WITH deep regret we announce the death of WILLIAM H. GILBERT, president of The S. S. White Dental Manufacturing Company, which occurred Saturday morning, March 16, 1912.

An account of Mr. Gilbert's life and of his services to the dental profession will appear in the next issue of the DENTAL COSMOS.

"IN MEMORIAM" RESOLUTIONS.

Dr. Safford G. Perry.

AT a special meeting of the Second District Dental Society of the State of New York the following resolutions upon the death of Dr. Safford G. Perry were unanimously adopted:

Whereas, it has pleased Almighty God to take from our midst our beloved brother, Dr. Safford G. Perry; and

Whereas, the Second District Dental Society, in deep sorrow, desires to record the loss of one who was its faithful friend; therefore be it

RESOLVED, That we, the members of the Second District Dental Society, do hereby express our sense of the great loss which we feel that the dental profession, not only in this city but in the world at large, has sustained. The heritage of his memory will be one which will remain ever bright in the history of the dental profession. And be it

RESOLVED, That these resolutions be spread in full upon the minutes of the society, and that copies be sent to the family of Dr. Perry and to the dental journals.

ELLISON HILLYER,
F. T. VAN WOERT,
R. OTTOLENGUI,
WILLIAM JARVIE,
Committee.

Brief Necrology.

Dr. JAMES WELTY of Greensburg, Pa., on February 22, 1912, in his thirty-second year. Deceased was a graduate of the Dental Department of Starling-Ohio Medical College.

G. A. BINGHAM of Washington, D. C., on January 22, 1912, of rupture of the gall-bladder, in his thirty-sixth year. Deceased was a senior dental student of George Washington University.

Dr. John R. Steele of Pittsburgh, Pa., on February 13, 1912, after prolonged illness, in his fortieth year. Deceased was a graduate of the University of Maryland, Dental Department, Baltimore.

Dr. Clarence James Barber of Auburn, N. Y., on February 10, 1912, following a surgical operation, in his fifty-fourth year. Deceased was a graduate of the Baltimore College of Dental Surgery, a prominent officer in the State National Guard, an honorary member of the Rochester Dental Society, and member of the New York State and Auburn Dental Societies.

Society Notes and Announcements.

DENTAL SOCIETY MEETINGS:

April, May, and June.

APRIL.

American Dental Society of Europe. Brussels, Belgium. Three days: April 5th, 6th, and 8th.

Connecticut State Dental Association. Bridgeport. Two days: April 16th and 17th.

Fifth District (N. Y.) Dental Society. Syracuse. Three days: April 11th to 13th.

Kansas State Dental Association. Salina. Three days: April 23d to 25th.

Odontological Society of Western Pennsylvania. Pittsburgh. Two days: April 9th and 10th.

Southern Minnesota Dental Society. Mankato. Three days: April 8th to 10th.

MAY.

Illinois State Dental Society. Springfield. Four days: May 14th to 17th.

Indiana State Dental Association. Indianapolis. Three days: May 21st to 23d.

Iowa State Dental Society. Des Moines. Four days: May 7th to 10th.

Kentucky State Dental Association. Louisville. Three days: May 27th to 29th.

Lake Erie (Pa.) Dental Association. Cambridge Springs. Three days: May 23d to 25th.

Massachusetts Dental Society. Boston. Three days: May 2d to 4th.

National Dental Protective Association. Washington, D. C. May 21st.

Nebraska State Dental Society. Lincoln. Three days: May 21st to 23d.

New York State Dental Society. Albany. Three days: May 9th to 11th.

North Dakota Dental Association. Grand Forks. Two days: May 7th and 8th.

South Dakota State Dental Society. Sioux Falls. Two days: May 14th and 15th.

Southern California Dental Association. Los Angeles. Three days: May 6th to 8th.

Susquehanna (Pa.) Dental Association. Wilkes-Barre. Three days: May 21st to 23d.

Texas State Dental Association. Abilene. Three days: May 2d to 4th.

Vermont State Dental Society. Burlington. Three days: May 15th to 17th.

Washington University Dental School Alumni Association. St. Louis. May 6th and 7th.

JUNE.

Arkansas State Dental Association. Little Rock. Three days: June 19th to 21st.

Canadian Dental Society and Ontario Dental Association. Hamilton, Ont. Four days: June 3d to 6th.

Georgia State Dental Society. Americus. Three days: June 11th to 13th.

Minnesota State Dental Association. St. Paul. Two days: June 14th and 15th.

Mississippi Dental Association. Gulfport. Three days: June 2d to 4th.

New Hampshire Dental Society. Weirs. Three days: June 19th to 21st.

Pennsylvania State Dental Society. Pittsburgh. Three days: June 11th to 13th.

TENNESSEE STATE DENTAL ASSOCIATION. Memphis. Three days: June 6th to 8th.

TRI-SOCIETY (N. J.) EXHIBITION AND CONVENTION. Atlantic City. Three days: June 19th to 21st.

Examiners' Meetings.

ARKANSAS BOARD OF EXAMINERS. Little Rock. June 17th and 18th.

FLORIDA BOARD OF EXAMINERS. Jacksonville. May 25th and 27th to 29th.

MARYLAND BOARD OF EXAMINERS. Baltimore. May 30th and 31st.

MICHIGAN BOARD OF EXAMINERS. Ann Arbor. June 17th to 22d.

NEW JERSEY BOARD OF REGISTRATION. Trenton. June 24th to 26th.

NORTH CAROLINA BOARD OF EXAMINERS. Raleigh. July 1st.

RHODE ISLAND BOARD OF REGISTRATION. Providence. June 25th to 27th.

TEXAS BOARD OF EXAMINERS. Houston. June 10th.

WEST VIRGINIA BOARD OF EXAMINERS. Wheeling. June 12th to 14th.

WISCONSIN BOARD OF EXAMINERS. Milwaukee. June 24th.

ASSOCIATION INTERNATIONALE DE PERFECTIONNEMENT SCIENTIFIQUE.

NINTH CONGRESS.

THE Ninth Annual Congress of the Association Internationale de Perfectionnement Scientifique (A. P. M.), under the patronage of the French government, will be held from August 3 to 31, 1912, in the Balkan States, Turkey, and Greece.

The Congress will be opened in Evian-les-Bains or Thonon-les-Bains (Lake of Geneva), and will proceed in the following order: Venice (via Simplon), Trieste, Adelsberg Caves, Agram, Belgrade, Danube Rapids, Kasan Defile, Iron Gate, Bucharest, Sophia, Constantinople, Mytilene, Smyrna, Athens, Phalerum, Eleusis, Corinth, Olympia, Corfu, Bologna (via Brindisi). The last meeting will be held at Aix-les-Bains.

Those wishing to present papers or reports on subjects pertaining to general or special medicine and surgery and allied sciences, hygiene in all its branches, prophylaxis, and charity, are requested to notify the central office.

The program of the congress will be published in the January issue of the Association's *Review*. A copy of this special number will be forwarded on application, if accompanied with a money order for 1s. 4d.

For further particulars address the president, Main Office A. P. M., 12 Rue François-Millet, Paris XVI, inclosing 2½d. in international return postage, or call at the office Wednesday or Saturday between 3 and 4 P.M.

DR. GHISLAIN HOUZEL, *Sec'y-general.*

CHAPIN A. HARRIS MEMORIAL FUND.

THE committee appointed by the Maryland State Dental Association in charge of the Chapin A. Harris Memorial Fund call your attention to the desire on the part of the dental profession to commemorate in a suitable manner their appreciation of the services rendered by this distinguished man in the effort to elevate the profession of dentistry.

While not a Marylander by birth, his life-work was accomplished in this state, which was his home, and it was in the city of Baltimore that he established the first dental school, thus making dentistry a profession.

Connecticut has recognized and honored the name of Horace H. Hayden, a co-worker with Harris, by erecting a handsome monument to his memory at Windsor.

We are now asking contributions from dental societies, colleges, and members of the profession at large, to aid in erecting a suitable monument to the memory of CHAPIN A. HARRIS, the Founder of Professional Dentistry.

Those wishing to contribute will kindly send to Dr. H. A. Wilson, treas., Calvert Bank Bldg., Baltimore, Md.

W. G. FOSTER, *Chairman,*
W. W. DUNBRACCO, *Sec'y,*
M. G. SYKES,
B. HOLLY SMITH,
T. O. HEATWOLE,
J. W. SMITH,
H. A. WILSON, *Treas.*

AMERICAN DENTAL SOCIETY OF EUROPE.

The thirty-ninth annual meeting of the American Dental Society of Europe will be held at the Palace Hotel, in Brussels, April 5, 6, and 8, 1912. An interesting program will be furnished, and a cordial invitation is extended to members of the profession to be present.

Geo. H. Watson, *Hon. Sec'y*,
Pariser Platz 7, Berlin, Ger.

CANADIAN DENTAL SOCIETY AND ONTARIO DENTAL ASSOCIATION.

Union Meeting.

A union meeting of the Canadian Dental Society and Ontario Dental Association will be held at Hotel Brant, Hamilton, Ont., June 3, 4, 5, and 6, 1912.

J. A. C. Hoggan.

NATIONAL DENTAL PROTECTIVE ASSOCIATION.

The annual meeting of the National Dental Protective Association will be held at the Fredonia Hotel, Washington, D. C., May 21, 1912, at 7.30 p.m., for the election of trustees and the transaction of business.

Richard Summa, *President*,
M. F. Finley, *Sec'y*.

ODONTOLOGICAL SOCIETY OF WESTERN PENNSYLVANIA.

The Odontological Society of Western Pennsylvania will hold its annual meeting on Tuesday and Wednesday, April 9 and 10, 1912, at the Monongahela House, Pittsburgh, Pa.

Drs. Matthew H. Cryer of the University of Pennsylvania, M. H. Fletcher of Cincinnati, Ohio, and T. H. Terry of Cleveland, as well as many local men, will present papers for the occasion.

The clinics will be of the usual high character. Exhibitors desiring space for this meeting will kindly communicate with

Jos. N. Katz,
1317 Fifth ave., Pittsburgh, Pa.
O. L. Hertig,
Wm. W. Booth,
Program Committee.

NATIONAL DENTAL ASSOCIATION.

Manufacturers' Exhibit.

The manufacturers' exhibit during the convention of the National Dental Association in Washington, September 10 to 13, 1912, inclusive, will be held in the New Ebbitt Hotel, which is just across the street from the headquarters and the clinics. Specifications, plans, rates, and full information can be had by addressing

Clyde M. Gearhart, *Ch'man Exhibit Com.*,
1616 I st., N. W., Washington, D. C.

CONNECTICUT STATE DENTAL ASSOCIATION.

The forty-eighth annual convention of the Connecticut State Dental Association will be held in The Stratfield, at Bridgeport, April 16 and 17, 1912.

A. V. Prentis, *Sec'y*,
New London, Conn.

KANSAS STATE DENTAL ASSOCIATION.

The forty-first annual convention of the Kansas State Dental Association will be held in the city hall at Salina, Kans., April 23, 24, and 25, 1912.

S. S. Noble, *President*,
Wichita, Kans.

SOUTHERN MINNESOTA DENTAL SOCIETY.

The twenty-seventh annual meeting of the Southern Minnesota Dental Society will be held at Mankato, Minn., April 8, 9, and 10, 1912. Programs will be issued in due time.

C. A. Hintz, *Sec'y*,
New Ulm, Minn.

FIFTH DISTRICT (N. Y.) DENTAL SOCIETY.

The forty-fourth annual meeting of the Fifth District Dental Society of the State of New York will be held at the Onondaga Hotel, Syracuse, N. Y., April 11, 12, and 13, 1912. All ethical members of the profession are cordially invited to attend.

J. N. Garlinghouse, *Sec'y*.

MASSACHUSETTS DENTAL SOCIETY.

THE forty-eighth annual meeting of the Massachusetts Dental Society will be held at the Harvard Dental School, in Boston, Mass., May 2 to 4, 1912.

WALDO E. BOARDMAN,
Boston, Mass.

NORTH DAKOTA DENTAL ASSOCIATION.

NOTE CHANGE OF DATE.

THE seventh annual meeting of the North Dakota Dental Association will be held at Grand Forks, N. D., May 7 and 8, 1912.

E. N. HEGGE, *Sec'y*,
Hatton, N. D.

SOUTH DAKOTA STATE DENTAL SOCIETY.

THE thirtieth annual meeting of the South Dakota State Dental Society will be held at Sioux Falls, May 14 and 15, 1912. Adoption of a new constitution and by-laws will take place at this meeting.

J. D. DONAHOE, *Sec'y*,
Sioux Falls, S. D.

WASHINGTON UNIVERSITY DENTAL SCHOOL.

ALUMNI ASSOCIATION.

THE annual clinic and reunion of graduates will be held under the auspices of the Alumni Association of Washington University Dental School, May 6 and 7, 1912, at the college building, Twenty-ninth and Locust sts., St. Louis, Mo. (The former dates of April 22d and 23d, first decided upon for the meeting, were changed to enable our fellow alumnus, Dr. G. V. Black of Chicago, to attend as guest of honor.)

This meeting promises to be unusually interesting, both in the way of papers and clinics, and all graduates should make a special effort to be present. All ethical dentists are invited to attend.

R. A. HARRIS,
E. A. WOELK,
F. E. MEYER,
Publicity Committee.

VERMONT STATE DENTAL SOCIETY.

THE next meeting of the Vermont State Dental Society will be held at Hotel Vermont, Burlington, Vt., May 15 to 17, 1912. The opening session will be on Wednesday at 2.30 P.M.

HARRY F. HAMILTON, *Sec'y*,
Newport, Vt.

LAKE ERIE (PA.) DENTAL ASSOCIATION.

THE forty-ninth annual meeting of Lake Erie Dental Association will be held at Hotel Bartlett, Cambridge Springs, Pa., May 23, 24, and 25, 1912.

C. L. MEAD, *Sec'y*,
Union City.

TEXAS STATE DENTAL ASSOCIATION.

THE thirty-second annual meeting of the Texas State Dental Association will be held at Abilene, Texas, May 2, 3, and 4, 1912. Exhibitors desiring space will please address Dr. C. M. McCauley, Abilene, Texas. The clinics will be in charge of Dr. J. O. Hall, Waco, Texas, who will furnish any information relative to the same.

All ethical practitioners are cordially invited to attend the meeting, and will be cheerfully furnished any other information by the secretary.

H. M. DAVISON, *President*,
Hubbard, Texas.
J. G. FIFE, *Sec'y*,
736 Wilson Bldg., Dallas, Texas.

IOWA STATE DENTAL SOCIETY.

GOLDEN ANNIVERSARY.

THE fiftieth annual meeting of the Iowa State Dental Society will convene at Des Moines, Iowa, May 7, 8, 9, and 10, 1912, beginning Tuesday, May 7th, at 9 A.M.

The Coliseum, with its large floor space, has been secured for clinics, exhibits, and lectures.

A special effort is being made to have all the old members who are alive present, and Thursday will be given over to the older dentists and ex-Iowa practitioners as a home-coming event, to exhibit, lecture, clinic, and banquet, and all are urged to attend. An historical paper is being prepared by Dr. J. B. Monfort of Fairfield, and pictures of early practitioners will be shown. This we expect to be one of our most interesting days.

The exhibits will be the largest ever given by any state society. Complete and extensive modern dental equipments, appliances, and instruments will be shown and demonstrated, and in contrast a large exhibit will be made of equipment, appliances, instruments, etc., of fifty years ago, that will be highly interesting and educational, and will be in charge of Dr. A. D. Clark of Charles City, Iowa, who would be pleased to correspond with anyone who might add to this exhibit. The modern exhibits will be in charge of Dr. H. A. Elmquist, master of exhibits, Des Moines, Iowa, to whom application for space should be made at an early date.

Further information will be furnished upon request from ethical practitioners of other states contemplating a visit to the meeting and to whom we extend a cordial invitation.

C. M. Kennedy, *Sec'y*,
605 Citizen's Nat'l Bank,
Des Moines, Iowa.

INDIANA STATE DENTAL ASSOCIATION.

The fifty-fourth annual meeting of the Indiana State Dental Association will be held at the Claypool Hotel, Indianapolis, Ind., May 21, 22, and 23, 1912.

W. W. Shryock, supervisor of clinics, promises the greatest clinic ever held in the state. W. E. Kennedy, executive committeeman, has already perfected a grand program, having secured the promise of papers from some of the best men in the dental profession. Carl Lucas, master of exhibits, has already almost the entire eighth floor of the Claypool Hotel reserved by the dental exhibitors.

This meeting will go down in the history of the association as a landmark, because of the large number of new members—our slogan "1000 members in 1912."

No dentist or exhibitor who wants to attend one of the very best meetings that will be held in 1912 can afford to miss the Indiana State dental meeting this year. You will be welcome.

Otto U. King, *Sec'y*,
Huntington, Ind.

KENTUCKY STATE DENTAL ASSOCIATION.

The meeting of the Kentucky State Dental Association will be held in Louisville, May 27, 28, and 29, 1912. A special attraction, consisting of talented men from out of the state, will be upon the program this year, and every indication points to the best state meeting that has been held for many years. The dentists in Kentucky are especially invited and a special invitation is extended to all ethical members of the profession.

W. M. Randall, *Sec'y*,
Louisville, Ky.

NEW YORK STATE DENTAL SOCIETY.

The forty-fourth annual meeting of the New York State Dental Society will be held at Albany, N. Y., in the Hotel Ten Eyck, May 9, 10, and 11, 1912.

Instructive papers have been secured, and the Clinic Committee will unquestionably present a fine list of clinics. (No clinics will be honored after March 20, 1912.) A special effort in behalf of exhibitors—for their comfort and sufficient space for exhibits—will be made by the Exhibit Committee. Address at once Dr. O. J. Gross, Schenectady, N. Y.

A cordial invitation is extended to all ethical dentists. Reduced rates on the certificate plan have been secured from points in New York, New Jersey, and Pennsylvania.

A. P. Burkhart, *Sec'y*,
52 Genesee st., Auburn, N. Y.

SUSQUEHANNA DENTAL ASSOCIATION OF PENNSYLVANIA.

The forty-ninth annual meeting of the Susquehanna Dental Association of Pennsylvania, will be held at Irem Temple, Wilkes-Barre, Pa., Tuesday, Wednesday, and Thursday, May 21, 22, and 23, 1912.

Executive Committee—A. E. Bull, Wilkes-Barre, chairman, T. W. Thomas, W. E. Davis, B. C. Courtright, A. J. Hefferman, and A. B. Miller. For information address the chairman.

All ethical practitioners are invited to attend, and all ethical dentists of Pennsylvania are eligible to membership.

Edmond J. Donnegan, *Recording Sec'y*,
Scranton, Pa.

ILLINOIS STATE DENTAL SOCIETY.

THE forty-seventh annual meeting of the Illinois State Dental Society will be held at Springfield, May 14, 15, 16, and 17, 1912.

J. F. F. WALTZ, *Sec'y*,
Decatur, Ill.

SOUTHERN CALIFORNIA DENTAL ASSOCIATION.

THE fifteenth annual meeting of the Southern California Dental Association will be held in Los Angeles, Cal., May 6, 7, and 8, 1912, at the Dental Department of the University of Southern California.

Note that the date and place of meeting coincide with the Imperial Council of the Mystic Shrine. Clinics and papers will be given by dental surgeons of national reputation.

W. W. MUNGEN, *Chairman*.

MISSISSIPPI DENTAL ASSOCIATION.

THE thirty-seventh annual meeting of the Mississippi Dental Association will be held at Gulfport, Miss., June 4, 5, and 6, 1912. All ethical practitioners are cordially invited to attend and take part in the meeting. Dr. A. J. Price of Gulfport, will have charge of the clinics, and will furnish any information as to same.

L. B. PRICE, *Sec'y*,
Corinth, Miss.

TRI-SOCIETY (N. J.) EXHIBITION AND CONVENTION.

A TRI-SOCIETY (N. J.) dental exhibition and convention will be held at Young's Ocean Pier, Atlantic City, N. J., June 19 to 21, 1912. The three societies entering into the arrangement are the Southern Dental, the Mercer, and the Atlantic County. The official designation is—"Second Annual Convention under the auspices of the Southern, Mercer, and Atlantic Dental Societies."

A preliminary committee, appointed by the Mercer Society, consisted of Drs. John E. Woolverton, John C. Forsyth, and E. H. Ginnelley; another, from the Southern Dental Society, of Drs. J. E. Duffield, Cromwell Ironsides, and Wm. H. Gelston; from the Atlantic County Society, of Drs. B. B. Filer, M. P. Shoemaker, and J. F. Crandall. These gentlemen held meetings in Trenton, Camden, and Atlantic City, and had power to draw upon the membership for committeemen to conduct the business of the exhibit and convention.

At a meeting held in Camden, February 21st, the president of the Atlantic County Society, Dr. A. L. Westcott, was elected chairman of an Executive Committee, and the president of the Southern Dental Society, Dr. Stanley Ironsides of Camden, and Dr. W. G. Chase of Princeton, president of the Mercer Society, vice-chairman. Dr. W. H. Gelston of Camden was elected secretary and Dr. John J. Blackman of Atlantic City, treasurer. To these are now added the subcommittee chairmen and Drs. John E. Woolverton, John C. Forsyth, and Cromwell Ironsides, of the preliminary committees.

At a meeting of the Executive Committee held in Camden, Wednesday, February 28. 1912, a thorough outline of the work of the convention was prepared, including the appointment of all committees.

Essay Committee—J. E. Duffield, chairman, Camden; C. H. Dilts, Trenton; John E. Woolverton, Trenton; A. K. Wood, Camden; C. C. Raith, Atlantic City; Mary Morrison, Salem; Sarah Jackson, Vineland.

Exhibit Committee—M. P. Shoemaker, chairman, Atlantic City; S. J. Callahan, Woodstown; A. L. Westcott, Atlantic City; W. G. Chase, Trenton; H. H. Baker, Atlantic City; F. J. Crandall, Atlantic City; James I. Woolverton, Trenton; C. Ironsides, Camden; B. B. Filer, Atlantic City.

Clinic Committee—W. H. Gelston, chairman, Camden; J. C. Forsyth, Trenton; G. P. Tuttle, Camden; John E. Woolverton, Trenton; A. B. Dewees, Camden; A. R. Slade, Millville; B. G. Duplaine, Atlantic City; J. S. Owens, Camden.

Hotels and Entertainment Committee—B. B. Filer, chairman, Atlantic City; C. W. Raith, Atlantic City; T. J. McLernon, Camden; M. P. Shoemaker, Atlantic City; J. F. Crandall, Atlantic City; D. A. Mulford, Salem; B. G. Duplaine, Atlantic City; F. K. Hazelton, Trenton; E. H. Peplow, Trenton.

Program Committee—E. H. Ginnelley, chairman, Trenton; A. E. Boice, Trenton; J. F. Crandall, Atlantic City; S. Ironsides, Camden; W. C. Carmany, Atlantic City; G. W. Wilkens, Trenton.

Registration Committee and Bureau of Information—H. H. Baker, chairman, Atlantic City; S. T. Percival, Atlantic City; W. R. Cornell, Camden; Marcus Weintrob, Atlantic City; J. J. Lerner, Atlantic City; G. W. Wilkens, Trenton; A. Vickers, Camden.

Press and Advertising Committee—W. W. Crate, chairman, Camden; J. F. Crandall, Atlantic City; James I. Woolverton, Trenton; C. P. Tuttle, Camden; M. J. Waas, Camden; W. C. Carmany, Atlantic City.

Electrical Committee—A. B. Dewees, chairman, Camden; M. P. Shoemaker, Atlantic City; W. H. Gelston, Camden; J. F. Crandall, Atlantic City.

Papers will be read on Thursday, June 20th, at 10 A.M., Friday, June 21st, at 10 A.M., and on Thursday, June 20th, at 8 P.M.

Clinics will be held on Thursday, June 20th, from 2 to 5 P.M.

The convention held at Young's Pier in 1911, by the Southern Dental and Atlantic County societies, proved successful, and with the assistance of the Mercer Society the convention this year should prove to be an even greater success.

WALTER W. CRATE,
Ch'man Press Committee.

TENNESSEE STATE DENTAL ASSOCIATION.

THE forty-fifth annual meeting of the Tennessee State Dental Association will be held at Memphis, Tenn., in the Business Men's Club rooms, June 6, 7, and 8, 1912.

The Business Men's Club extends the courtesies of the club to all the visiting dentists, and the association invites all ethical dentists to attend.

CHAS. A. TAVEL, *Pres.*,
J. L. MANIRE, *Sec'y.*

GEORGIA STATE DENTAL SOCIETY.

THE forty-fourth annual meeting of the Georgia State Dental Society will be held at Americus, Ga., June 11, 12, and 13, 1912.

Instructive papers have been secured and the Clinic Committee will unquestionably present a fine list of clinics. A cordial invitation is extended to all ethical dentists.

M. M. FORBES, *Sec'y*,
810-11 Candler Bldg., Atlanta, Ga.

PENNSYLVANIA STATE DENTAL SOCIETY.

THE forty-fourth annual meeting of the Pennsylvania State Dental Society will be held in Carnegie Music Hall, Pittsburgh, June 11, 12, and 13, 1912. A program of exceptional interest is being prepared.

LUTHER M. WEAVER, *Recording Sec'y.*

NEW HAMPSHIRE DENTAL SOCIETY.

THE annual meeting of the New Hampshire Dental Society will be held at Hotel Weirs, Weirs, N. H., June 19, 20, and 21, 1912. All members of the profession are cordially invited to be present.

FRED F. FISHER, *Sec'y*,
Manchester, N. H.

MINNESOTA STATE DENTAL ASSOCIATION.

THE twenty-ninth annual meeting of the Minnesota State Dental Association, which will be held in St. Paul, Minn., June 14 and 15, 1912, promises to be the largest in the history of the organization. The large clinic and manufacturers' exhibit will occupy the entire top floor of the new Lowry Building, the largest and best equipped dental and medical building in the West.

At that time of the year the Twin Cities, with their wealth of parks and beautiful lakes, afford an ideal spot for a vacation, and the business and instruction of the meeting may well be combined with the recreation so necessary to our profession.

For information address

BENJAMIN SANDY, *Sec'y*,
636 Syndicate Bldg., Minneapolis, Minn.

NORTH CAROLINA DENTAL SOCIETY.

THE thirty-eighth annual meeting of the North Carolina Dental Society will be held at Raleigh, N. C., in the hall of the house of representatives in the Capitol, July 3, 4, 5, and 6, 1912.

Instructive papers have been secured, and the Clinic Committee will unquestionably present a fine list of clinics. A cordial invitation is extended to all ethical dentists.

J. W. STANLY, *Sec'y*,
Wilmington, N. C.

BROOKLYN ODONTOLOGICAL SOCIETY.

The dentists of the eastern section of Brooklyn, N. Y., have decided, for their mutual interest and for the advancement of dental science, to organize into a society—hence the formation of the Brooklyn Odontological Society. Several meetings have been held with temporary officers.

At the last meeting, February 29, 1912, the following permanent officers were elected: A. Ritt, Chairman; M. A. Feldman, vice-chairman; J. Pensak, corresponding secretary; B. Shapiro, financial secretary; N. Gold, treasurer; M. Nevin, librarian.

J. Pensak, *Sec'y.*

WISCONSIN BOARD OF EXAMINERS.

The Wisconsin State Board of Dental Examiners will convene in Milwaukee, Wis., at Marquette University, on Monday, June 24, 1912, at 9 A.M., for examination of applicants to practice in Wisconsin.

High-school diploma, applications, and $25.00 fee must be filed with the secretary fifteen days prior to above date. Dental diploma to be presented in advance of examination.

W. T. Hardy, *Sec'y,*
422 Jefferson st., Milwaukee, Wis.

MARYLAND BOARD OF EXAMINERS.

The Maryland State Board of Dental Examiners will meet for examination of candidates for certificates, May 30 and 31, 1912, at the Dental Department of the Baltimore Medical College, at 9 A.M.

Candidates must pass a written examination in anatomy, physiology, chemistry, bacteriology, oral surgery, operative and prosthetic dentistry, pathology, therapeutics, and materia medica. The practical requirements consist of the insertion of one gold and one amalgam filling in the mouth, and the submission of a metal plate or bridge of not less than four crowns—two of which shall be of porcelain—the parts being assembled and invested in advance and soldered in the presence of the board.

Applications, accompanied by the fee of ten dollars, must be filed with the secretary prior to May 30th. For application blanks or further information, apply to

F. F. Drew, *Sec'y,*
701 N. Howard St., Baltimore, Md.

TEXAS BOARD OF EXAMINERS.

The next meeting of the Texas State Board of Dental Examiners, for the purpose of examining applicants for a license to practice dentistry and dental surgery in the State of Texas, will be held in Houston, Texas, beginning June 10, 1912, at 9 A.M.

For application blanks and any further information address

J. M. Murphy, *Sec'y,*
Temple, Texas.

MICHIGAN BOARD OF EXAMINERS.

The next regular meeting of the Michigan State Board of Dental Examiners will be held at the Dental College, Ann Arbor, Mich., commencing Monday, June 17, 1912, at 8 A.M., and continuing to the 22d inclusive.

For application blanks and full particulars address

F. E. Sharp, *Sec'y,*
Port Huron, Mich.

WEST VIRGINIA BOARD OF EXAMINERS.

The West Virginia State Board of Dental Examiners will hold their regular examination, in Wheeling, W. Va., June 12, 13, and 14, 1912.

For information write

J. Fleetwood Butts, *Sec'y,*
Charleston, W. Va.

NEW JERSEY BOARD OF REGISTRATION.

The State Board of Registration and Examination in Dentistry will hold their semi-annual meeting in the Assembly Chamber of the State-house at Trenton, N. J., June 24, 25, and 26, 1912; practical work on the 24th.

Application must be on hand one week prior to the examination.

Charles A. Meeker, *Sec'y,*
29 Fulton st., Newark, N. J.

NORTH CAROLINA BOARD OF EXAMINERS.

THE next regular meeting of the North Carolina State Board of Dental Examiners will be held in Raleigh, N. C., July 1, 1912. For further necessary information address

F. L. HUNT, *Sec'y*,
Asheville, N. C.

ARMY DENTAL SURGEONS.

MEMORANDA OF CHANGES.

For the week ending February 17, 1912:

First Lieut. G. E. Stallman, February 7th, reported for temporary duty at Fort Sill, Okla.

James F. Feely, C.D.S., February 8th, reported for temporary duty at Fort Totten, N. Y.

First Lieut. C. C. Lauderdale, February 10th, left Fort Logan, Colo., *en route* to Walter Reed General Hospital, Takoma Park, for treatment.

First Lieut. R. E. Ingalls, February 7th, left temporary duty at Boise Barracks, Idaho, *en route* to station, Fort Douglas, Utah.

For the week ending February 24th:

R. E. Ingalls, C.D.S., February 8th, returned to Fort Douglas, Utah, from temporary duty at Boise Barracks, Idaho.

For the week ending March 2d:

John D. Milliken, C.D.S., February 26th, ordered to proceed to his home for annulment of contract.

James F. Feely, C.D.S., February 29th, reported for temporary duty at Fort Wood, N. Y.

For the week ending March 9th:

Charles E. Sherwood, C.D.S., February 26th, left Presidio of Monterey, Cal., *en route* to Presidio of San Francisco, Cal., for temporary duty.

First Lieut. F. H. Wolven, February 27th, ordered to Fort Stevens, Ore., for temporary duty.

James F. Feely, C.D.S., March 4th, reports for temporary duty at Fort Dupont, Del.

First Lieut. George L. Mason, March 2d, reported for temporary duty at Fort Riley, Kans.

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UNITED STATES PATENTS

PERTAINING OR APPLICABLE TO DENTISTRY

ISSUED DURING FEBRUARY 1912.

February 6.

No. 1,016,456, to GEORGE W. TODD. Artificial tooth.

No. 1,016,555, to LOYD DAVIS. Tooth.

No. 1,016,786, to JAMES BERNARD SEDBERRY. Dental swage.

February 20.

No. 1,018,340, to JERRY A. PRESCOTT. Dental disk holder.

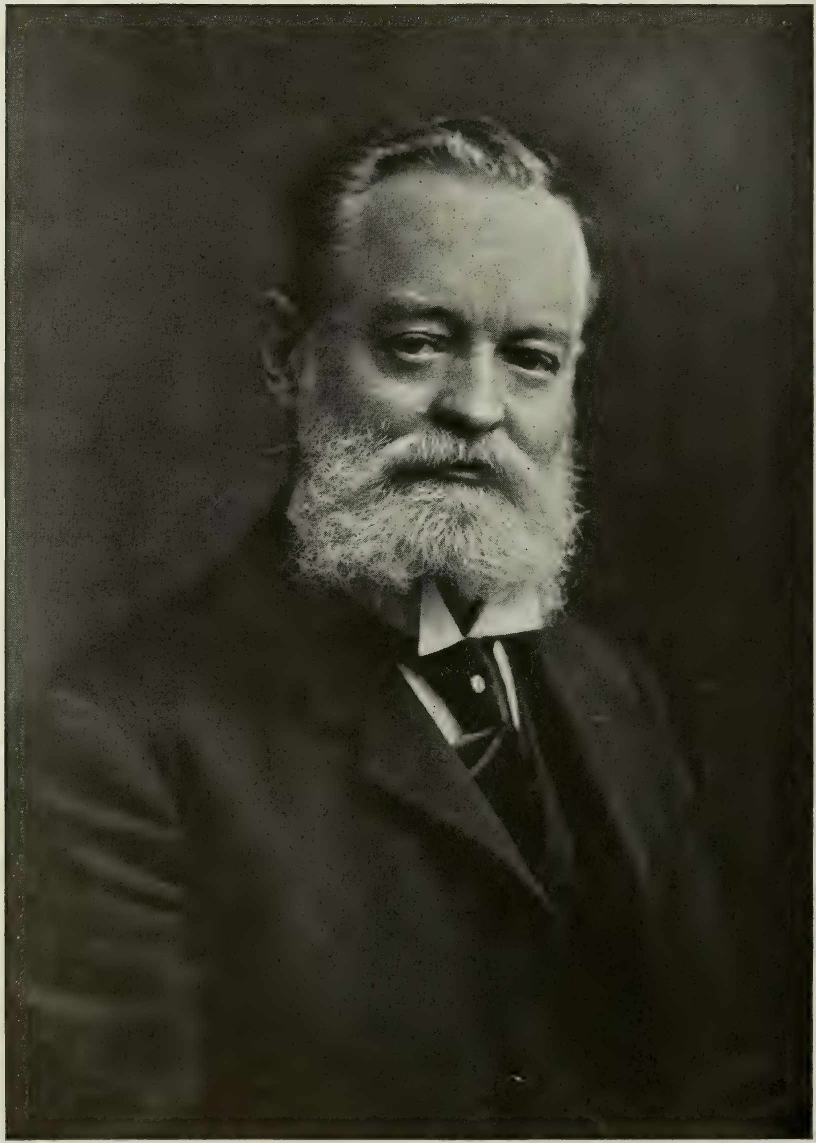
February 27.

No. 1,018,466, to WILLARD F. WILSON. Impression holder.

No. 1,018,712, to LOUIS F. KOEHLER, Dentists' anvil.

No. 1,018,713, to LOUIS F. KOEHLER. Dentists' anvil.

No. 1,018,803, to ALEX F. ANDERBERG. Anchoring device for teeth fillings.



WILLIAM H. GILBERT.

THE

DENTAL COSMOS.

VOL. LIV. MAY 1912. No. 5.

ORIGINAL COMMUNICATIONS.

EXPANSION OF THE DENTAL ARCH AND OPENING THE MAXILLARY SUTURE IN RELATION TO THE DEVELOPMENT OF THE INTERNAL AND EXTERNAL FACE.

By HERBERT A. PULLEN, D.M.D., Buffalo, N. Y.

(Read before the forty-third annual union meeting of the Seventh and Eighth District Dental Societies of the State of New York, Buffalo, N. Y., November 9, 1911.)

IT must have occurred to the most casual observer of today that the chief aim of both medical and dental science has changed from curative to preventive methods of treatment.

MODERN PROPHYLAXIS.

If this aim is to be carried out consistently, it follows that, in order to prevent disease or deformity, the beginning of all preventive and prophylactic measures must be directed upon the human organism from the time of its earliest infancy. "From the cradle to the grave" has now become the motto of the health hygienist, and thus it is that the child and its environment, its work and its play, but chiefly its health, is the center of all-absorbing interest.

The ideal physical condition which we all have in our minds as possible for the child is represented by such a state of normality of bodily function and structure that there is no room left for disease.

EFFECTS OF NORMAL AND FAULTY RESPIRATION.

This mental ideal of the normal, physically perfect child encompasses health, beauty, and happiness. When one considers the charm of a well-proportioned and well-balanced face and a winning smile, displaying a beautiful row of pearly teeth, our mental picture becomes fascinating.

Evidences of faulty respiration or undeveloped or asymmetrical dental arches are inconceivable in the perfectly normal face; in fact, the whole external face reflects the evidence of an anatomically perfect internal face, with well-developed dental arches, well-developed nasal passages, and a healthy tonsillar ring. A step farther, and we might read as well a normally healthy body and a healthy mind, the expression of which is complete and care-free happiness.

The uncommonness of these conditions brings us to a contrast to this mental picture, another one which is pathetic—with open, drooping mouth, protruding teeth, narrow jaw and face, dull countenance, and absence of lines of harmony. The nasal passages are undeveloped, there is deflection of the nasal septum, enlarged turbinates, adenoids and enlarged tonsils, the hearing is impaired, and the child speaks with muffled tone. Further examination of such a child reveals a narrow chest and consequent lack of respiratory function, stunted growth and underweight, all evidences of a hard struggle for physical existence.

This is not an infrequent history—though perhaps in some cases it is less marked—of many of the children who are suffering from what may be called the vicious cycle in the oral and nasal cavities.

Whereas the dentist can mitigate and relieve bad dental conditions, and the rhinologist can remove adenoids, tonsils, and nasal obstructions for the restoration of normal nasal respiration and ventilation and drainage of the nasal sinuses, and the ophthalmologist can relieve eyestrain and assist in the development of proper correlation of eye function, there still remains a field of operation which, because of its possibilities of assisting in the development of the internal and external face, because of its stimulation to bone-building in the maxillæ and superimposed structures of the nose, and its consequent restoration of the functions of normal nasal respiration and normal occlusion, bids fair to outrank in importance these other mentioned fields in its possibilities of further physical benefit to the children of today.

BENEFITS AND AIMS OF ORTHODONTIC TREATMENT.

Orthodontia or facial orthopedia steps in when rhinology and ophthalmology have done their best for the child with deficient nasal and optical function, even deficient mental function, and offers at the present time the only hope for further operative treatment that will be of physical benefit. For orthodontic treatment is, in the young child, stimulative to normal development, not only of the dental arches but of the superimposed anatomical structures of the face above and surrounding the dental arches, viz, the structures of the nose and adjacent tissues of the internal face.

But at this point it should be emphasized that the greatest benefit from orthodontic treatment is obtained in the early years of childhood, when such pathological changes as arrested development of the maxillæ or of the nasal structures are first apparent, and before confirmation by several years of mouth-breathing with its many ills, and abnormal development of the internal and external structures of the face, have shut the door to the best opportunity for effective treatment.

It should be understood, therefore, that orthodontic treatment is primarily aimed at the restoration of normal developmental processes, of normal nasal respiration, and of normal occlusion, which functions, when properly established and continued, mean not only the normal growth and use of the structures of the internal face and the production of harmonious facial lines, but the health and welfare of the entire body as well.

It is evident, then, that the greatest mission of orthodontia is not "straightening crooked teeth," but correcting maldevelopment of both structure and function of the dental and maxillary arches, and thereby assisting development in the associated regions of the internal and external face.

NORMAL STRUCTURE OF THE INTERNAL FACE.

In order to understand better this field of operation in orthodontia, it may be well to refer to some of Dr. Cryer's splendid illustrations of the anatomical relations of the internal face, and first to consider in Fig. 1 a section of the head which exhibits large and well-developed sinuses, and to note the large antra, the well-developed dental arches, and the sufficiency of breathing-space in the nasal sinuses.

This is a good example of the normal structure of the internal face, and exhibits the interdependence of structure of the dental and maxillary arches and the whole superimposed structure of the face.

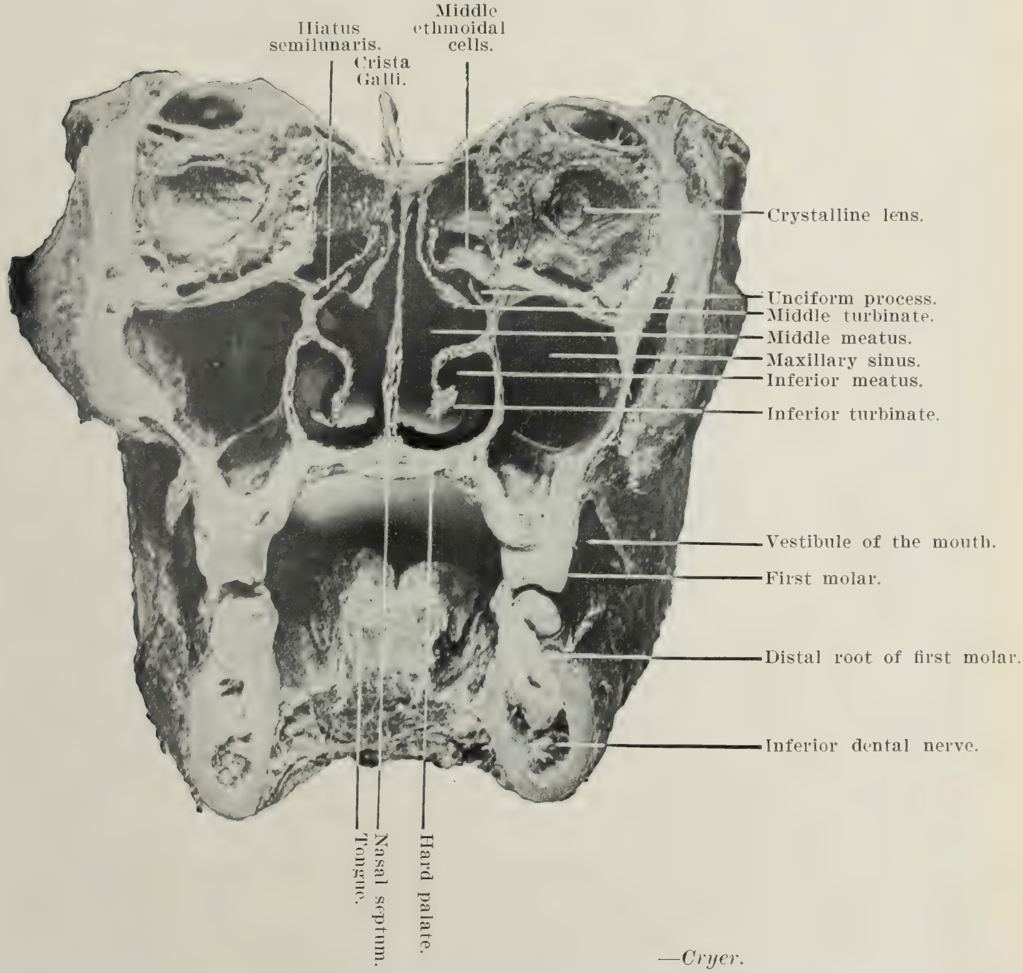
It is primarily upon this structural continuity of the maxillary arches with the structures of the nose, and upon the contiguity of the internal sinuses, as well as upon the correlation of the functions of respiration and occlusion, that the possibility of influencing development and restoring function in these correlated parts of the face is based.

INTERDEPENDENCE OF EXTERNAL AND INTERNAL FACIAL STRUCTURES.

Just so far as these related structures are harmoniously developed will there be proper correlation of structure and function, but let there be a marked deviation from normal development in one of these regions, and it will be found to have caused a similar lack of development in the correlated structure of either the maxillary and dental arches or in the nasal structures. Thus it is that an undeveloped dental arch means an undeveloped nasal cavity, and *vice versa,* and an interference in one region with normal occlusion and in the other with normal respiration.

These are established facts which can easily be verified by the examination of anatomical specimens varying from the normal conditions shown in Fig. 1 to such an extent that this interrelation-

Fig. 1.

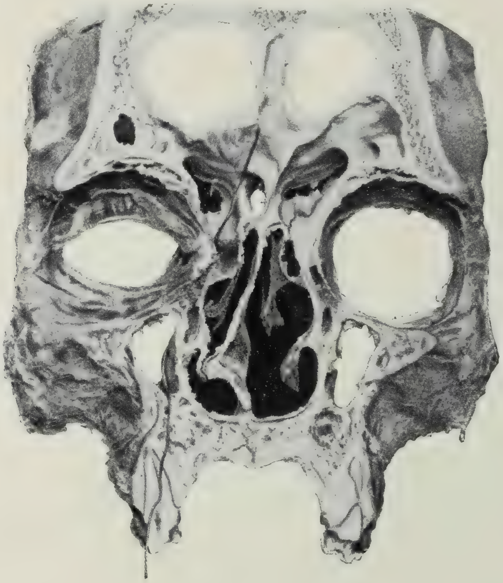


—*Cryer.*

ship of structure and function in these associated structures is self-evident.

For example, in Fig. 2 a considerable variation in the anatomical region under discussion is shown. Observe the narrow and high maxillary arch, and, in the nasal meati above, a serious obstruction to nasal breathing on one side, caused by the deflection of the nasal septum, also the small antral sinuses, indicating lack of full development. Even the orbital cavities are of unequal depth, indicating a general lack of harmonious bilateral development of the upper part of the face.

Fig. 2.



—*Cryer.*

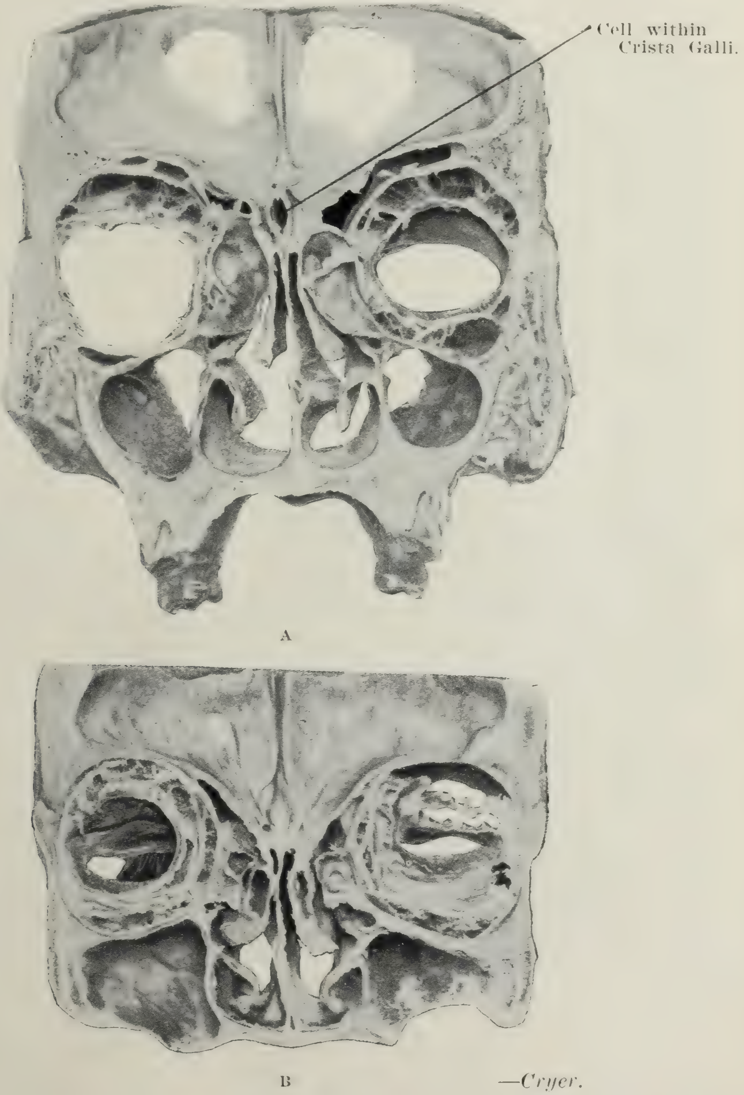
Again, we might compare two vertical transverse sections made from different skulls in about the same anatomical region (Fig. 3), differentiating in the upper one large, well-developed nasal sinuses, and in the lower one small, undeveloped nasal sinuses having very little air-space and hence deficient respiratory function. All of the sinuses of the upper section, except the maxillary sinus, are larger than those of the lower section, which indicates greater internal facial development, better functioning and more proportionate external facial symmetry in the upper section.

TYPAL VARIATIONS AND PREDISPOSITIONS.

When we further consider some of these anatomical variations of the internal face with reference to the type of head in which they occur, a peculiar and important relationship of the correlated internal structures of the maxillary arches and nasal structures will be found. For example, there are certain types of individuals with the dolichocephalic type of head, or long and narrow skull, that may be said to be anatomically predisposed to deficient nasal and maxillary development in comparison with individuals of the brachycephalic or mesocephalic type with short broad skulls.

Take for illustration the two sections of skulls shown in Figs. 4 and 5, and note in Fig. 4 the width of the skull as compared with its length—a typical brachycephalic skull, with large antra, fully developed nasal meati, comparatively straight nasal septum, low palatal vault, and wide maxillary arches. In this type of structure of the skull and internal face, normal development of all the associated structures seems to be predestined and expected. The excess, as it were, of the space for the nasal sinuses could not allow of deficient respiration, and the width of the maxillary arches could not allow of a deficiency in occlusal development and function of the teeth.

Fig. 3.



—*Cryer.*

In Fig. 5, a dolichocephalic skull, exhibiting a very narrow face in proportion to its length, the very opposite of the previously shown normal conditions, is observed, where it would seem that the skull had been internally compressed. The antra are almost obliterated, the nasal fossæ compressed, the septum deflected, the ethmoidal cells undeveloped, and the maxillary arches narrow.

This latter class, according to one writer, Dr. Hartz of Detroit, Mich., "always suffer more or less, and are the most frequent visitors to the rhinologist and the orthodontist. They have inherited a type of facial structure called the leptoprosopic, which is a narrow and long face, with high and thin nose, small orbital cavities and accessory sinuses, small nasal chambers, and a high arched palate and limited alveolar processes, in which the normal teeth cannot find proper alignment. Then we find a type of face that we are tempted to say was produced by nasal stenosis and mouth-breathing. The fact is, however, that many of these have never had nasal obstruction, although from their appearance it would be the natural inference. Such patients are very prone to nasal stoppage by inflammation, and the smallest portion of the normal pharyngeal tonsil may produce complete collusion."

Fig. 4.

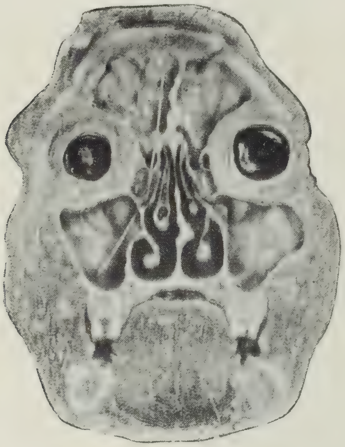
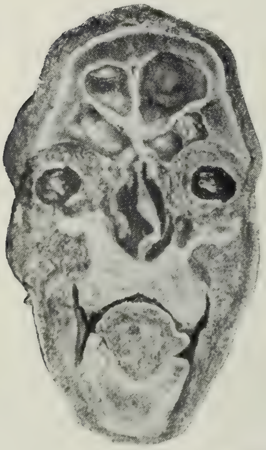


Fig. 5.

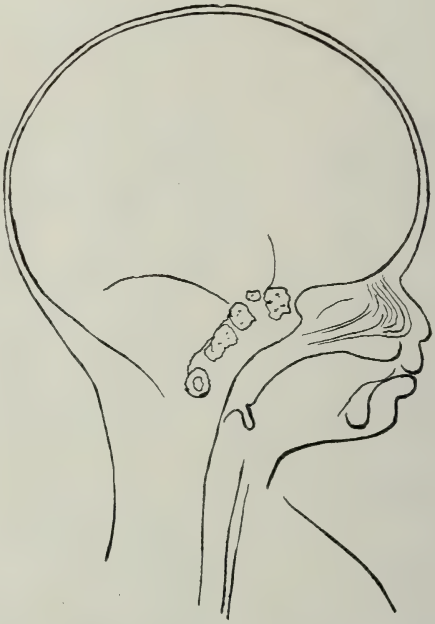


—*Cryer.*

BENEFICIAL RESULTS OF EXPANSION OF THE DENTAL ARCHES UPON DEVELOPMENT OF THE INTERNAL FACE.

In the various skull sections shown, attention has been particularly called to certain deviations from the typical anatomy of the internal face which would indicate concomitant deficiency of development and function of the nasal structures and maxillary arches from which the following conclusions could be drawn:

Fig. 6.



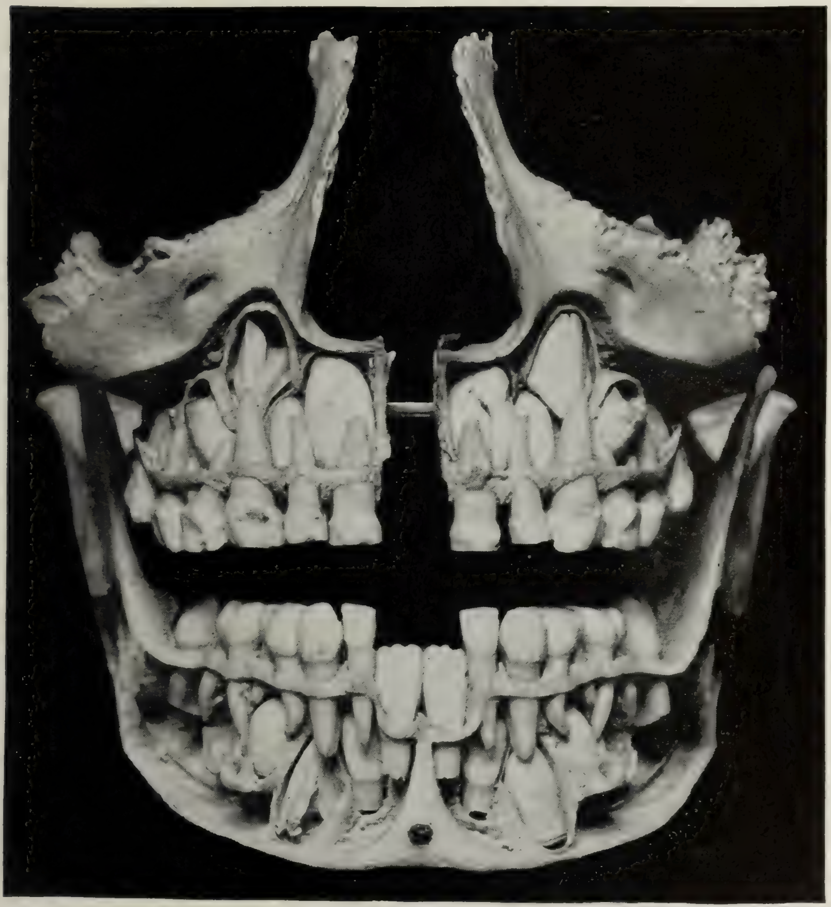
Skull at birth, showing relative proportions of cranium and face.

On account of this interdependence of function and structure between the maxillary arches and superimposed nasal structures, we may infer that whatever interferes with development in one of these regions will interfere with development in the other, and, conversely, whatever assists in the development of one of these regions will assist in the development of the other.

It is a matter of everyday practice in orthodontia to expand the dental arches, and by so doing to increase the development of the maxillary arches, hence, even without further argument, it can be assumed that the nasal structures and sinuses directly above the maxillary region receive at the same time an impetus to further development.

Again, when the early age at which orthodontic treatment should be begun is taken into account, the amount of added growth in the whole face, in response to artificial stimulation through expansion of the maxillary arches, can be assuredly anticipated. For example, if in the skull at birth (Fig. 6) the relative proportions of the face and cranium are as 1 : 8, and the face increases in proportion to the size of the cranium more rapidly during childhood, so that the ratio at two years stands as 1 : 6, at five years as 1 : 4, at ten years as 1 : 3, and in the adult as 1 : 2, the resultant beneficial effects of expansion of the dental arch between the ages of approximately four and ten years are sure to be assisted by nature herself during these years of rapid downward growth of the face at a time when the bony tissues are most impressionable.

FIG. 7.



—*Noyes.*

Section of face exhibiting the approximation of developing permanent teeth to the base of the nasal structures.

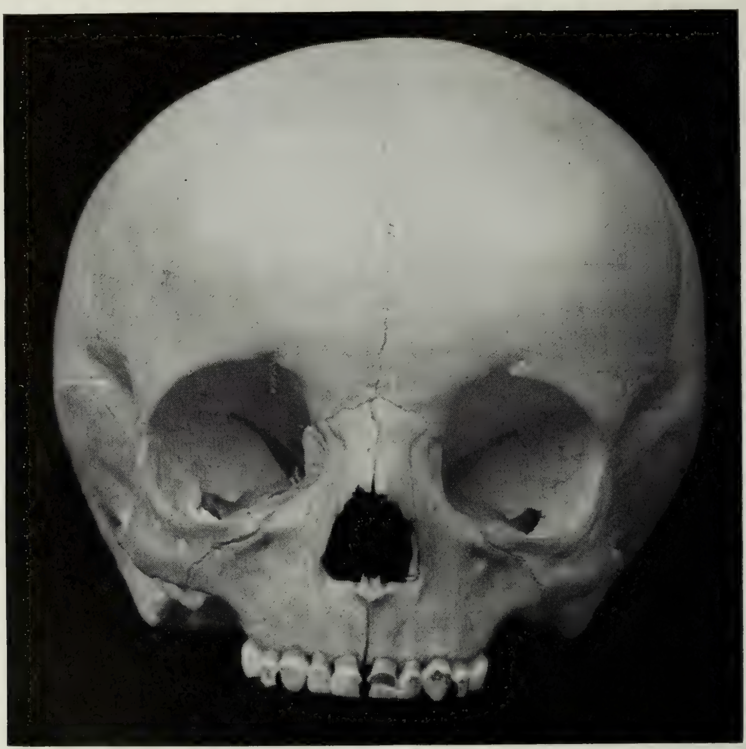
In a further study of some important

anatomical considerations in regard to the growing tissues of the internal face, we can find added support for our belief in the direct assistance to development of the internal and external face through early expansion or development of the dental arches.

For example, the relative approximation of the developing permanent teeth to the base of the nasal structures, as shown in Fig. 7, would indicate that any stimulation to development of these teeth, in cases where an undeveloped dental and maxillary arch is anticipated, will exert its developmental influence at least upon the approximating tissues of the nasal cavities and the internal sinuses.

The crown of the central incisor closely approximates the floor of the nasal chambers; the canine lies not far distant but a little higher up, approaching more closely the wall of the antrum. The crowns of the bicuspids are inclosed within the roots of the deciduous molars, so that the lateral movement of expansion of the deciduous molars must carry these bicuspid crowns buccally, and thus materially assist in the development of the dental and maxillary arches, and of the closely approximating structures of the nose and internal face.

FIG. 8.

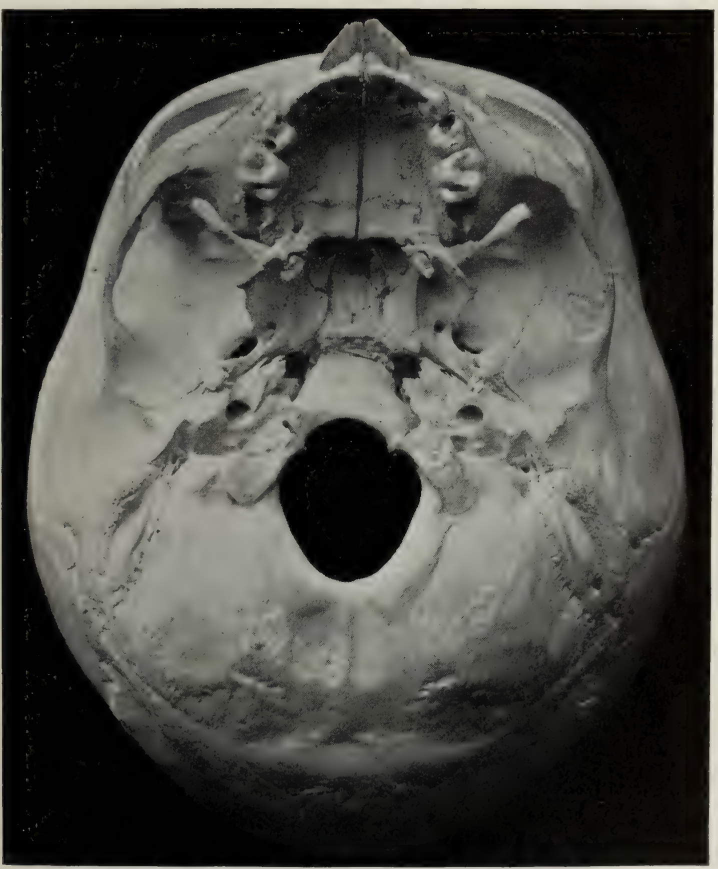


Anterior view of cranium and face showing the sutures uniting the facial bones.

The histologist gives us added support for our belief in the extensive developmental influence of expansion of the dental arch. Dr. F. B. Noyes, in the *American Orthodontist* for May 1908, says: "Bone is formed and re-formed in response to mechanical stimuli, and the entire surface is arranged in harmony with the mechanical stresses which result from the force applied to the teeth and the surface of the bone." It is reasonable to expect, therefore, that the bony tissues will develop during arch expansion in the direction of the force exerted within them, and if operations are begun during a period of development, the influence of arch expansion will be even more extensive.

It has been stated that the influence of arch expansion could not extend farther than the alveolar process, since there is a line of separation between the alveolar process and the maxillary bone proper. It is the opinion of some histologists who have made a special study of this subject that there is no line of demarcation between the bone of the maxilla and of the alveolar process. Dr. J. Bethune Stein and Dr. F. B. Noyes both hold this opinion, which seems the more reasonable and is quite generally accepted by those who have occasion to expand the dental arches to any extent.

Fig. 9.



Palatal view of sutures.

EARLY ORTHODONTIC TREATMENT INDICATED.

As to the proper time when the dental arch should be expanded, very little difference of opinion exists. Almost everyone will agree that if this operation is done during the developing period of childhood, the assistance of nature in the bone-

Fig. 10.

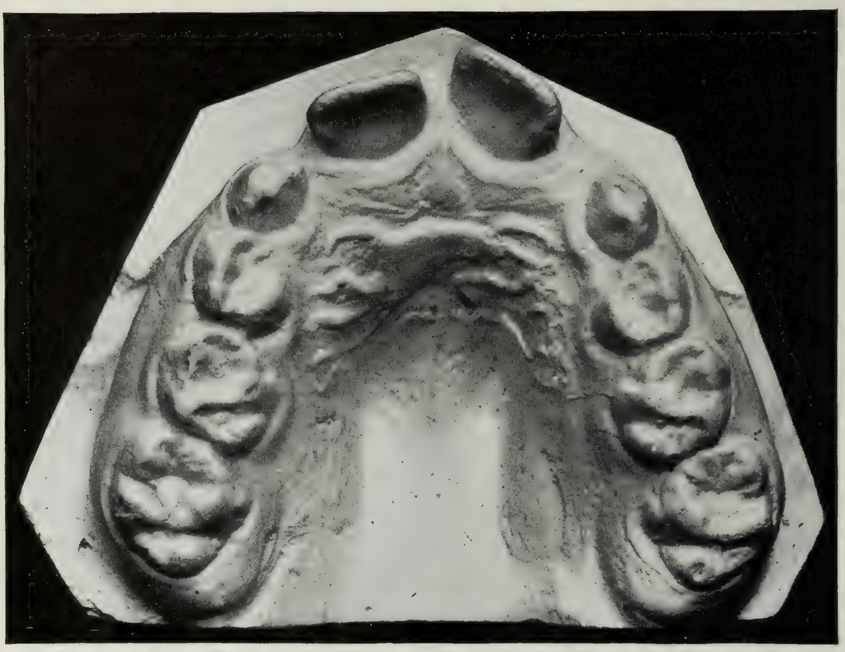
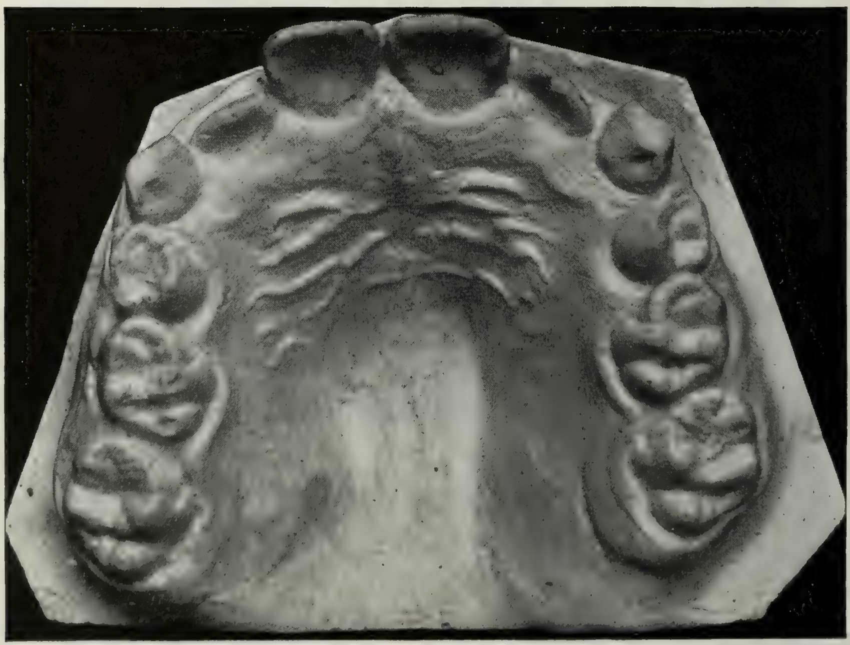
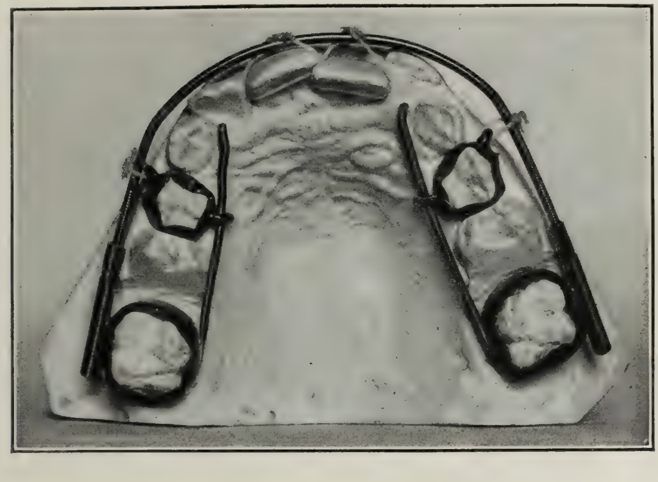


Fig. 11.



building process tends to make the orthodontic process more nearly a stimulation to natural growth and development, as compared to the breaking down of bony and alveolar tissues already fully formed in the more adult cases of malocclusion, when very little new bone is likely to form to support the teeth in their new positions after orthodontic treatment.

Fig. 12.



If the dental arches are expanded some little time before the roots of the deciduous molars show signs of absorption, the crowns of the permanent teeth inclosed within the roots of these molars, as well as the surrounding osseous tissues, will be moved into a larger arc, forming a new and wider base for further development. This period of development will conform most nearly to the natural physiological changes in the tissues operated on, the change in these structures being analogous to the natural developmental processes which would take place in cases in which no arrest of development in these regions is observed.

Fig. 13.

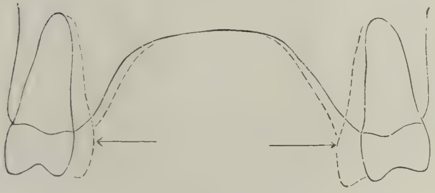
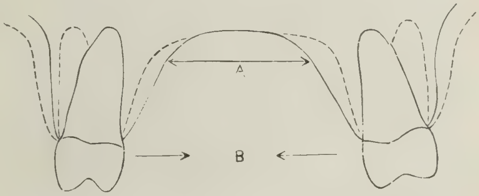


Fig. 14.



—*G. S. Monson.*

MEMBRANOUS CHARACTER OF SUTURES OF FACIAL BONES.

Again, a factor which is of great importance as regards the development of both the internal and external face, exists in the fact that the sutures of the skull are not fully ossified until near adult life, but are filled with a fibro-membranous connective tissue, which allows of extreme mobility of the facial bones united by these sutures, so that the force exerted by expansion of the dental arches easily influences the growth of these bones. Fig. 8 shows the membranous sutures in the facial bones of a child of about five years of age. These sutures of the facial bones are those joining the maxillary bones with each other and with the malar, nasal, frontal, vomer, and lacrymal bones. A view of the under side of this same skull (Fig. 9) exhibits the following sutures which are affected in arch expansion, viz, the intermaxillary, ethmoidal, palatal, and sphenoidal.

Dr. Geo. H. Wright of Boston has emphasized the idea of the membranous character of the sutures of the facial bones in a paper published in the DENTAL COSMOS for June 1911, and has called attention to the possibilities of maxillary readjustment through a proper understanding of this sutural relationship. He says: "But in and between the various sutures of the facial bones of the young, irrespective of the size, shape, or function of the parts, we find in variable amounts this fibrous connective tissue, with its possibilities for reorganization under the influence of stimulation. If this were not so, there would be no cranial enlargement for the developing brain, no elongation in growth of the face, no horizontal broadening across the face through the transverse sutures from the fronto-malar to its fellow opposite. In fact, if the contiguous parts should unite in complete ossification soon after birth, there would be no development beyond that found in a baby's face."

FIG. 15.

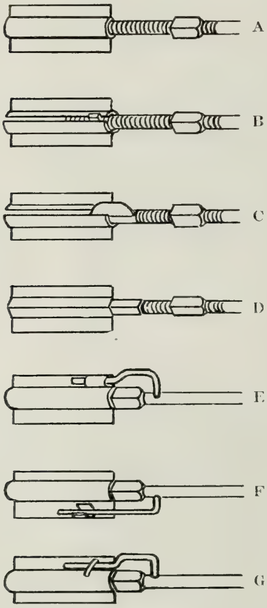


FIG. 16.

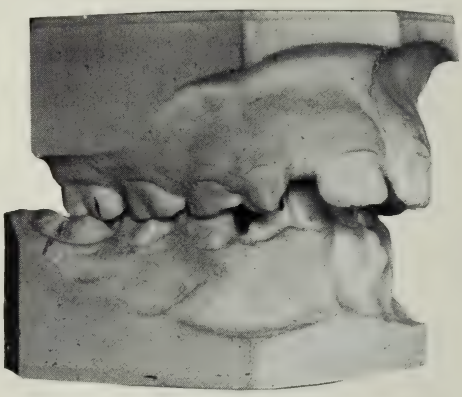
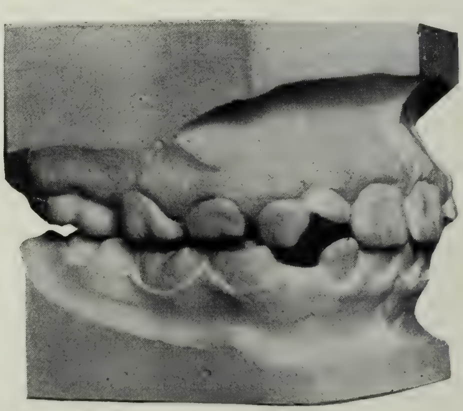


FIG. 17.



CORRECTION OF NASAL DEFORMITIES BY ARCH EXPANSION.

This writer also observes that—"The greatest deformities of the nasal region exist in the region of the anterior third of the lower turbinals and lower meatus." This is also significant, since this region of the nose is nearest in location to the maxillary region, which responds most readily to readjustment through expansion of the dental arch or opening of the maxillary suture, of which I shall presently speak.

If bone responds to the stimuli upon its surface or in its interior, the movement of the teeth in the expansion of the dental arch such as is shown in Figs. 10 and 11 must have exerted considerable influence upon the bony tissues in which they are embedded, and enough so for one to be assured that the stimulation to growth and development has extended beyond the apices of the roots of the teeth into the region of the nasal meati and other adjacent sinuses. This case was treated with the plain expansion arch supported by round buccal tubes on molar clamp bands similar to the combination shown in Fig. 12, the lingual wires serving to move the canine and deciduous molars on each side in phalanx, though not bodily through the bone of the maxilla.

It has been observed in many cases treated in this manner, *i.e.* by tipping the crowns of the teeth outward instead of bodily moving the teeth, that the restored function of occlusion tends to retain and increase the normal development of the bone surrounding the apices of the roots and eventually to straighten them from their inclined positions. Dr. Angle and his followers practically confirm this observation from practice in a large number of cases.

FIG. 18.

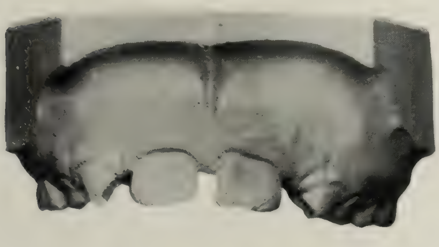


FIG. 19.

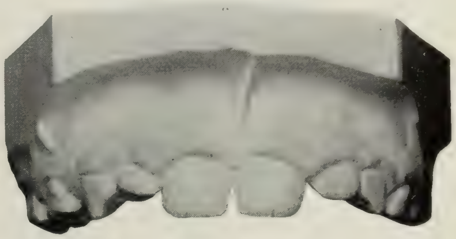


FIG. 20.

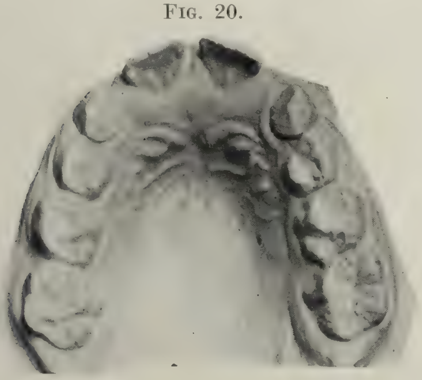
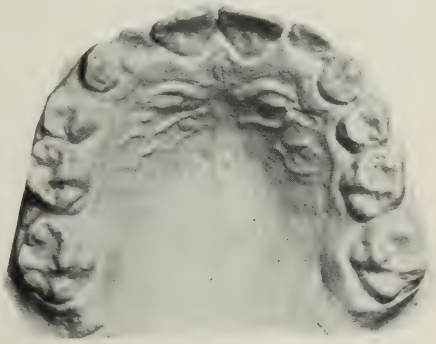


FIG. 21.



It might be safely stated that there is a large percentage of cases in which the expansion of the dental arches by using the round or horizontally hinged buccal tube is sufficient for the requirements. However, if there is any nasal stenosis due to such obstructions as deflected septa or adenoids, a more nearly bodily movement of the teeth in expansion of the dental arch will undoubtedly exert a greater influence upon the development of the nasal passages and the surrounding bony tissues of the internal face, and will better assist in overcoming the results of the nasal obstructions.

Fig. 22.

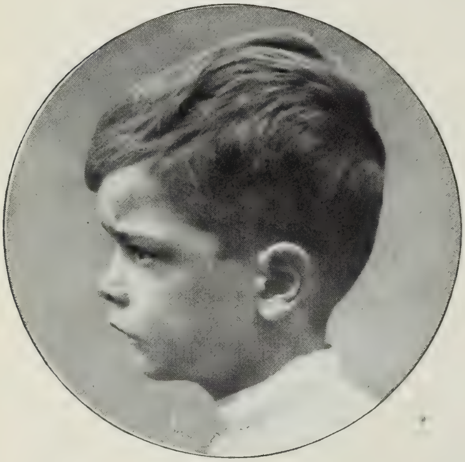


Fig. 24.

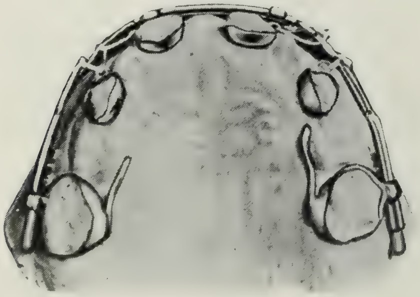


Photo of divided arch adapted for opening the suture.

MODIFICATIONS OF ORTHODONTIC APPLIANCES EMPLOYED FOR MOVING TEETH.

For example, in Figs. 13 and 14 the difference in action of the expansion arch upon the bony tissues surrounding them, in the tipping of the anchor teeth and in their bodily movement, may be compared. The tendency in the use of the round buccal tube, as indicated by the drawing in Fig. 13, is to tip the crowns of the teeth outward, at the same time that the roots of the teeth tip inward, the outer plate of the maxillary process serving as a fulcrum.

Fig. 23.

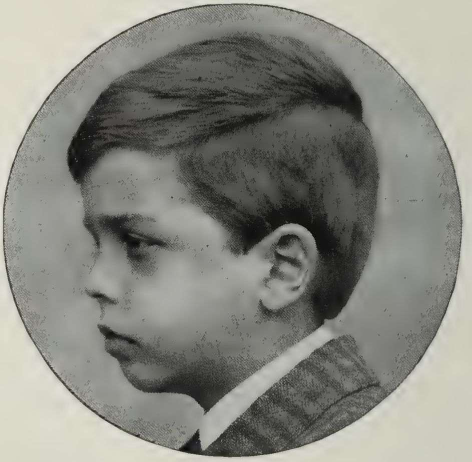
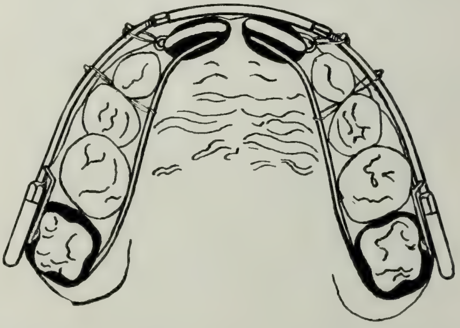


Fig. 25.

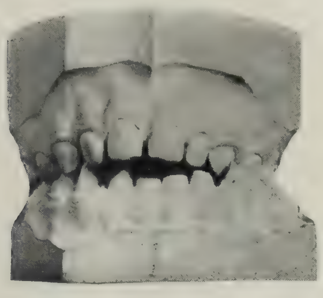


Drawing of divided arch in same position as Fig. 24.

The use of some device for preventing the tipping of the anchor teeth will cause them to move bodily through a horizontal plane as indicated by the drawing in Fig. 14, the apices of the roots moving the same distance as the crowns, with a correspondingly greater developmental influence upon the maxilla, the nasal structures, and surrounding tissues of the internal face.

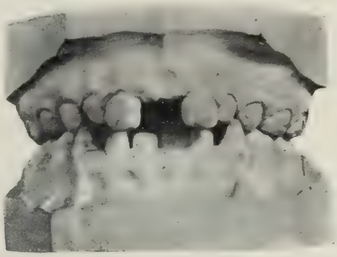
It may be of interest to note the variations in construction of the buccal tube supporting the expansion, and other devices applicable for the fixation of the expansion arch so that there can be no horizontal hinge action within the buccal tube, and consequent tipping of the anchor teeth. In Fig. 15, A shows the round arch in the round buccal tube. D illustrates the square buccal tubes of Dr. Kemple, the inner square tube being soldered to the expansion arch and sliding into the larger square buccal tube, which when soldered to the molar band effectually prevents any turning of the expansion arch within the tube. B shows the split buccal tube of Dr. Abell, a spur on the expansion arch engaging the split portion in the buccal tube, preventing the turning of the arch in the tube. Dr. Ottolengui has devised an ingenious modification of this principle, as shown in C.

FIG. 26.



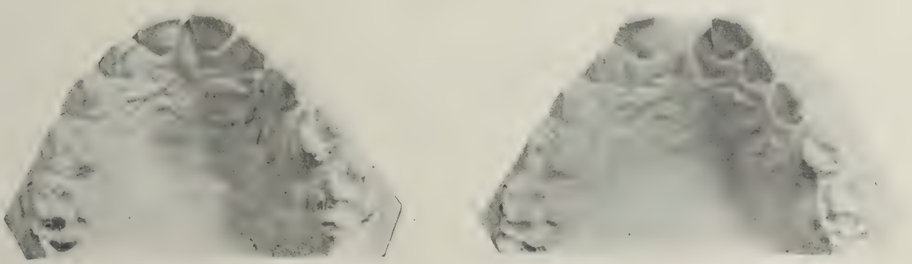
Dr. Hawley's case before opening suture.

FIG. 27.



After opening suture.

FIG. 28.



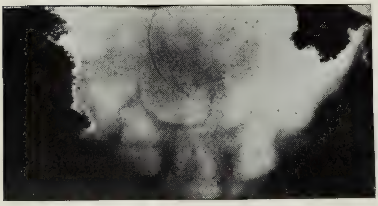
Occlusal views of the same case before and after opening suture.

A flattening of the round buccal tube at the distal end, or the use of an oval buccal tube and a similar flattening of the ends of the expansion arch by filing, will accomplish the same purpose as the other methods suggested above, and is much simpler.

A simple device of Dr. V. E. Barnes for securing bodily movement of the anchor teeth consists of an arm soldered to the expansion arch in front of the nut and sliding into a short tube attached to the large buccal tube, as shown in E. A modification of this device in F allows the arm to rest on a curved spur attached to the buccal tube. Another variation from this method is shown in G, the arm extension being retained by a short cross-bar of metal above the buccal tube, allowing of the bending outward of the arm extension so as to cause a lateral spring. Another method of moving the anchor teeth bodily is embodied in Dr. Barnes' modification of the Ainsworth appliance in the use of vertical tubes on molar bands, as shown in an appliance for opening the maxillary suture, Fig. 32.

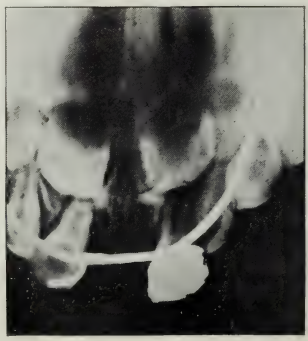
These various combinations with the buccal tubes effect the bodily movement of the anchor teeth only, and in order to secure the bodily movement of the other teeth in the lateral halves of the maxilla, further reinforcement of these teeth through the proper application of force becomes necessary; but the limits of this paper require that further elaboration other than exhibiting the main principle of bodily movement of the teeth should not be entered into.

FIG. 29.



Radiograph of the same case before opening suture.

FIG. 30.



After opening suture.

An insight into this part of the technique of arch expansion, which illustrates the manner in which the mechanical principles involved should be taken advantage of to produce the most extensive influence on the development of the dental and maxillary arches, serves to still further confirm the theory that this developmental influence may, by a proper understanding of the technique and a correct application of force, be made to extend beyond the dental and maxillary arches into the more remote regions of the internal face.

POSSIBILITIES OF DEVELOPMENT FOLLOWING ARCH EXPANSION.

Internally through the sphenoid bone and its many articulations, resting as it does upon the superior maxillary bones, the lines of stress created by proper expansion or development of the dental arch are favorable to a still greater stimulus to internal development of the face and head—increased blood supply, increased metabolism, increased nutrition, increased function, and increased growth being the physiological sequence of events in these related parts.

Dr. F. Parke Lewis describes the following interesting sequence of possibilities after expansion of the dental arch: "When the contour of the arch upon which the brain-case rests is altered by an expansion of its base, or by a change in its basal curve, every buttress and flying buttress is modified by this variation as a direct consequence. The keystone of the skull is the sphenoid. If we modify the base against which the cornerstone rests, we are altering a series of contingent relationships; we are modifying the nutritional supply as it is carried to one side or the other, permitting or interfering with—if we begin while the tissues are still plastic—symmetrical development of the head, and changing the structural conditions of the mouth, the nose, the face, the orbit, and the eyes, and through these the brain functions, and ultimately the brain itself, and therefrom every bodily function and tissue."

DEVELOPMENT IN THREE DIMENSIONS.

An interesting point brought out by Dr. G. V. Black in 1893, and quoted by Dr. F. B. Noyes in a recent paper published in the DENTAL COSMOS for November 1911, is the fact that in the growth of the dental arches the development takes place in three dimensions of space, corresponding to the dimensions of length, breadth, and height. An example of such development may be noted in the following case:

In Figs. 16 and 17, showing the right side of the casts in occlusion of the case before and after treatment, the development in the dimensions of length and height of the dental arches is evident.

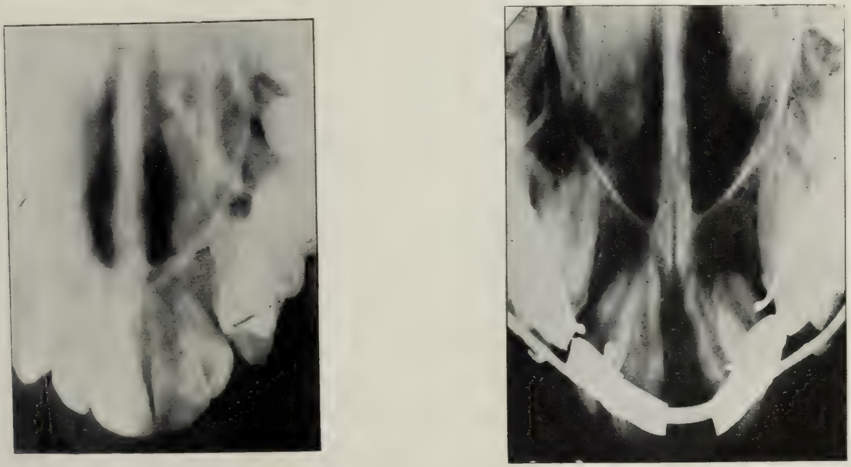
In Figs. 18 and 19, the front view of the upper casts of the same case exhibits the development in breadth to advantage.

In Figs. 20 and 21, the occlusal views of the same case illustrate the development in the dimensions of length and breadth of the dental arches during treatment. This corresponds to the developmental directions in the growing face, and illustrates the point that the development of the dental and maxillary arches cannot be considered independently of its possibility for assisting development in the associated anatomical structures of the internal and external face.

The photographs of the case before and after treatment shown in Figs. 22 and 23 exhibit the wonderful transformation in the external face possible through a following out of the principles of dental arch development as outlined in part in this essay. It will be observed that the recession of the chin and the distal occlusion of the lower dental arch are but symptoms of mal-development, which respond to proper treatment at an early age.

From the illustrations shown and the descriptions of the interrelationship of the dental and maxillary arches and the nasal structures above, it will be realized that the field for developmental possibilities of the whole internal and external face is reasonably shown.

FIG. 31.



Skiagraphs of another case before and after opening suture.

CONDITIONS FOR DEVELOPMENTAL POSSIBILITIES.

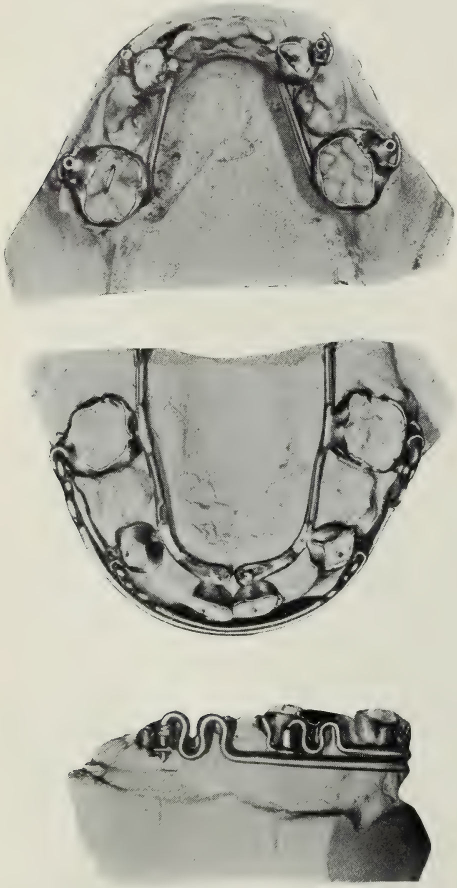
The conditions upon which these developmental possibilities are based are as follows:

(1) Close interrelationship of structure and function.

(2) Favorable quality of the bone and suture in the child.

(3) Gradual growth of the bone by mechanical stimulation.

FIG. 32.



Dr. Barnes' appliance for opening the suture.

(4) Proper application of force to secure the greatest extent of development in the internal and external face.

From these factors, as well as from the observation of many treated cases, the conclusion can be drawn that expansion of the dental and maxillary arches is the only definite means of developing the internal and external face.

ADVANTAGES OF OPENING THE MAXILLARY SUTURE.

Of a slightly different nature as to method and as to its probable results, but especially worthy of our consideration in connection with the discussion of the expansion of the dental arches by usual methods, is the operation known as "opening the maxillary suture," which, by reason of its now being more extensively performed than heretofore, with reported beneficial results, should claim the attention of the progressive orthodontist.

In addition to the extensive developmental influence of the bodily movement of individual teeth in expansion of the dental arch, there may be a great advantage in the operation of opening the maxillary suture, especially in those cases of mouth-breathing which present narrow nasal meati and contracted dental arches. In these cases, by a separation of the halves of the maxilla in a short period of time, the nasal meati are immediately enlarged, and the quickest opportunity is given for the restoration of normal nasal breathing through increase of respiratory capacity by way of the enlarged nasal passages.

From the examination of the maxillary suture in a child's skull (Figs. 8 and 9), it will be evident that this operation should be easily accomplished at an early age, when these sutures are readily separated by the proper application of force. It must not be understood that this operation is all that is necessary in a given case, as there may be contracted lower dental arches and a complication of mesial or distal occlusion, as well as malposition of individual teeth that may require further operative treatment.

Again, it must not be understood that this operation is advisable in all cases, but only in those cases in which the diagnosis of extremely bad nasal conditions warrant it.

It is a short cut to a desired goal, *i.e.* that of producing in the patient an immediate restoration of respiratory function, rather than obliging him to wait for its more gradual restoration after the longer period of expansion and development of the dental and maxillary arches.

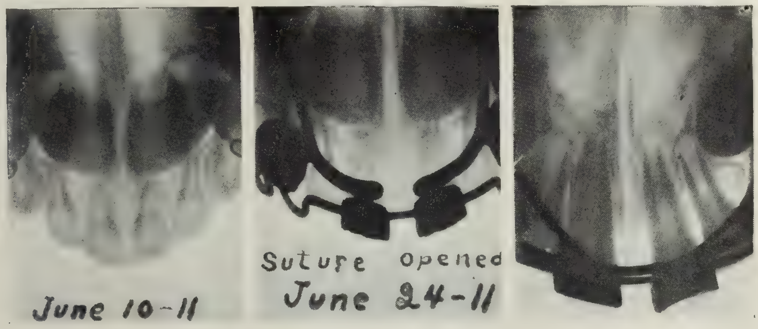
METHODS OF OPENING THE MAXILLARY SUTURE.

This operation has been performed for many years in a desultory way, but always with marked beneficial results. Dr. Goddard records having performed this operation with a jackscrew at a very early date. Dr. Geo. S. Monson describes, in the DENTAL COSMOS, 1898, vol. xl, page 914, an appliance combining the jackscrew with a split metal plate. Dr. R. Ottolengui, in a paper on "Spreading the Maxilla *vs.* Spreading the Arch" (1904) described the split plate with wooden wedge for opening the maxillary suture.

At the present time, more modern appliances are used for the purpose of opening the suture, care being taken to so apply the force that advantage will be taken of bodily movement in the molar region, and direct lateral force will be exerted in the median incisor region.

Dr. C. A. Hawley uses the divided arch for this purpose, as illustrated on the cast of a treated case in Fig. 24, and diagrammatically in Fig. 25. The incisor and molar bands are connected by a lingual wire, and the extension arm on the divided arch secures bodily movement in the molar region. The greatest force in the divided arch being in the central jackscrew, the greatest force is in the region of the anterior teeth to separate the lateral halves of the maxilla. The incisors are ligated to spurs on each side of the central tube, and when the nuts are turned up at either end of this tube the lateral force exerted to separate one lateral half from the other is sufficient to open the maxillary suture. Dr. Hawley reported at the last meeting of the American Society of Orthodontists the following case, which is one of fifteen that he has treated in this manner.

FIG. 33.



a *b* *c*

a, Radiograph before opening of suture, and showing size of permanent teeth. *b*, The suture opened—X ray by Dr. E. B. Lodge. *c*, X ray of another suture opened in the same manner—X ray by Dr. Hill.

A boy of four years, presenting the upper arch in lingual occlusion on one side, was referred to him by a rhinologist, who had removed the child's adenoids, and reported that he also had a deflected nasal septum. Fig. 26 exhibits the casts of the case before treatment, showing the contracted arches and the lingual occlusion on the left side.

Fig. 27 shows the result of eighteen days' treatment in the attempt to open the maxillary suture, the indications of this opening having occurred being shown in the separation at the median line between the central incisors, and in the quick widening of the upper arch without tipping of the teeth.

Fig. 28 shows the occlusal view of the casts before and after treatment.

Figs. 29 and 30 represent the skiagraphs taken of the maxilla before and after treatment. As the child moved during the taking of the first skiagraph, it is a little indistinct, but the second picture exhibits the separation of the deciduous central incisors as well as of the unerupted permanent central incisors.

This case was referred back to the rhinologist after treatment, and he reported, upon further examination of the nasal passages, that the deflection of the septum had disappeared.

Fig. 31 shows the radiographs before and after treatment for opening the suture in another of Dr. Hawley's cases, in which the evidence is rather negative, as the suture is apparently opened but little, if at all.

Dr. Hawley concludes that "What seems to take place is the stretching of the thin plates of the palate between the reinforced portion along the suture and the thick alveolar structure surrounding the teeth."

Another type of appliance, devised by Dr. V. E. Barnes for opening the maxillary suture, is shown in Fig. 32. It consists, as shown, of double arches, sprung into vertical tubes on canine and molar bands, which are united by a lingual wire.

Fig. 33 shows the X-ray evidence before and after opening the suture in one of Dr. Barnes' cases.

Another method used by Dr. Barnes consists in the use of a jackscrew located high up in the vault of the palate, operating upon a framework built from each lateral half of the dental arch to secure bodily movement.

Dr. G. V. I. Brown claims to have used the jackscrew originally for the purpose of opening the maxillary suture, with marked beneficial results upon the breathing capacity of the nasal passages.

INDICATIONS FOR OPENING THE MAXILLARY SUTURE.

The experience of various operators with this method of maxillary readjustment by opening the suture argues favorably for its use for the purpose intended, viz, quickly increasing nasal capacity and respiratory function. As to its influence upon the developing dental arches, nothing as yet has been deduced, and it must not be thought that it solves the question of arch development, since there are areas or zones in each lateral half of the upper dental and maxillary arches which need development but which this method does not reach, and which are responsive only to the mechanical stimulation of arch expansion in the usual manner, provided bodily movements of the teeth are secured.

The particular necessity for the operation of opening the maxillary suture, therefore, would seem to be present in the case of the child suffering from lack of breathing-space in the nasal passages, where such an operation can give more immediate relief and the regular treatment for development of undeveloped zones is to be instituted later, after the halves of the maxilla have become firm in their new positions. For it is not reasonable to conclude that the restoration of normal respiratory space, and therefore of the function of respiration, will be of enough influence to cause sufficiently rapid development of undeveloped zones in the maxillary arches to restore the entire natural growth in these parts.

CONCLUSION.

For some of this arrested development, then, dependence must be placed upon the slower but surer method of expansion of the dental and maxillary arches, which by reason of the perfected technique, as has been pointed out in this paper, exerts a developmental influence upon the dental and maxillary arches, and upon the superimposed structures of the internal face, during a period of child growth which insures the success of the object intended, viz, a sufficient stimulation to growth of these structures to allow of their restoration to the normal in structure as well as function. The child may thereby be benefited in general health as well, owing to increased respiratory and occlusal function, the production of which through a proper technique lies within the power of every careful and conservative orthodontist.

[See also *Discussion*, as reported under "Proceedings of Societies," this issue.]

ORAL SEPSIS.

By M. L. RHEIN, M.D., D.D.S., New York, N. Y.,
LECTURER ON DENTAL PATHOLOGY, DEPARTMENT OF DENTISTRY, UNIVERSITY OF PENNSYLVANIA.

(Read before the Northeastern Dental Association, at its annual meeting, held at Portland, Me., Friday, October 27, 1911.)

IN the August issue of *Current Literature* there appeared a review of an address on oral sepsis delivered by Dr. William Hunter of London in October 1910 and published in the *Lancet* of January 14, 1911.

DR. W. HUNTER'S CRITICISM OF AMERICAN DENTISTRY.

This review has started a wave of protest in America that has extended broadcast over the country. The editors of American dental journals have been flooded with requests to come to the defense of the fair fame of American dentistry, which was so viciously attacked by the writer in *Current Literature*. The able editors of the DENTAL COSMOS and *Dental Review* have both responded to the requests of their readers, and the editorials in these journals on this subject are well worth perusing. These two editors, each a characteristic exponent of the very best in American dentistry, have treated the subject from entirely different viewpoints. Dr. Johnson's editorial has all the earmarks of having taken the so-called excerpts from Dr. Hunter as published in *Current Literature* as correctly representing the eminent British medical authority. A careful perusal of Dr. Hunter's article in the *Lancet* indicates that the editor of *Current Literature* has either not been able to understand Dr. Hunter or else has maliciously misinterpreted his just condemnation of a species of dentistry that is only too common.

"SEPTIC AND ASEPTIC" DENTISTRY.

I had started arranging the material for this paper this summer, and when I read the able editorial on this subject published in the October number of the DENTAL COSMOS I found that it covered my own views so thoroughly that I would like to insert the entire editorial as a quotation into this paper. A careful review of Dr. Hunter's paper discloses the fact that he thoroughly realizes the difference between good and bad dentistry, or, as he graphically states it, between septic and aseptic dentistry. In this address he calls the attention of the medical profession to facts which, while they may be new in strictly medical circles, tell a story old in dentistry. He says:

> My clinical experience satisfies me that if oral sepsis—and naso-pharyngeal—could be successfully excluded, the other channels by which "medical sepsis" gains entrance into the body might almost be ignored. Sepsis as an important and prevalent cause of disease in medicine would almost cease to exist, instead of being, as in my judgment it is at the present time, a more important and prevalent cause of disease in the domain of medicine than it is in that of surgery.

Dr. Kirk in his editorial calls attention to the fact that this is no discovery on the part of Dr. Hunter, but that this truth was thoroughly elucidated by Dr. Miller in his original work on "Micro-organisms of the Human Mouth." This work of Miller's was no surprise to the educated dental world, even in 1890. His carefully detailed experimental work in the laboratory, showing the methods by which the oral micro-organisms are absorbed in the general economy even to the point of destroying human life, simply corroborated the observed clinical data noted by dentists for years prior to this date.

THE PHYSICIAN'S INDIFFERENCE TO ORAL SEPSIS.

It has been unfortunate that the insidious nature of this grave evil has been ignored by medical men for so many years. This apparent indifference of the physician to oral sepsis has unquestionably had an important bearing on the reckless indifference shown by so many dentists to the presence of septic foci in the alveolus. The blame for this state of affairs rests in the omission in the medical curriculum of any proper teaching as to the physiology or pathology of the oral cavity. The physician will always be the adviser of the public as to things pertaining to health; but, without any education in this field, the ignorance of medical men leaves them totally unfitted to judge as to either the condition of mouths or the quality of dental service.

If they had obtained a fair theoretical instruction in correct dental principles, their natural position as mentors of the public health would have caused them to educate the people as to the insidious dangers of oral sepsis, in the same manner as they have taught them the danger of a septic peritonitis or appendicitis. They would have demanded aseptic operations from the dentist, and he would have had no difficulty in obtaining a grateful remuneration for performing such work.

NECESSITY FOR ADEQUATE DENTAL FEES.

From all over the world I have received the same characteristic letters: We cannot get paid for the time needed to remove pulps properly and to seal root-canals aseptically. It is the imperfect work done in this field that is accountable for most of what Hunter chooses to call septic dentistry.

Such being the condition of affairs, it remains for us dentists to educate the physician and public to the fact that this work can be done so that the alveoli are left absolutely free from any possibility of septic foci, but that such operations require a great deal of time and skill, and consequently entitle the dentist to adequate compensation. The people value their good health too highly to choose septic dentistry because it is cheap, if they are but made to understand its fatal effect on the body proper.

DENTISTS' NEGLIGENCE.

That this educational propaganda has been well started in dentistry is attested by the interest that has been aroused in oral hygiene all over our country. In dental societies, in public meetings and clinics, among the school children, in the boards of public health, the interest in oral hygiene has grown by leaps and bounds. It is consequently most timely to call attention to the fact that a hygienic condition of the mouth is always questionable where any portion of dead pulp tissue is allowed to remain in the root-canals of any tooth. Even though free from infection at the moment of the insertion of a filling, a root may be the starting-point of an active septic condition on the morrow. Consider the myriads of little gumboils that never trouble the patient. There are many dentists who calmly assure their patients that these are perfectly harmless, especially if they give proper attention to monthly visits for prophylaxis. Not that I would decry the value of these visits, but what a sham and fraud it is to bring our patients to our office at regular intervals with the understanding that by so doing the mouth would remain in an aseptic state, and then ignore the presence of these septic foci in the alveolar sockets! The picture is not a pleasant one.

CASES OF NEGLECT AS REVEALED BY RADIOGRAPHS.

Then, again, the radiograph has shown us that we have very greatly underestimated the number of teeth with so-called blind abscesses, in which the septic absorption is much greater than where an open sinus exists. Are we ignorant of dentists who advise non-interference in such cases so long as the teeth give no discomfort? Let me cite a recent case, the radiographs of which I shall show.

In March Mrs. A., age about thirty-three, asked to have her mouth examined prior to going abroad. She said her previous dentist had died, and as she intended sailing ten days later, she thought her teeth should be cleaned and any work required should be done. An examination showed the teeth to be in fair condition with the exception of the upper left lateral incisor. The slight discoloration and marked opacity at once disclosed a dead pulp. The radiograph (Fig. 1) shows the extent of an abscess sac in the apical space. Upon calling the patient's attention to the fact that she was suffering from septic poisoning due to this condition, she appeared to be very skeptical. She said this opaqueness of the tooth had been present for over four years. The tooth had never given her any discomfort, and when she had asked her dentist if it required any attention, he had replied, "Let sleeping dogs lie." After a great amount of persuasion on my part, she made an appointment. This had to be very soon on account of her departure, and I explained to her that I was canceling other patients' appointments because I considered the case so serious as to warrant such measures. On the morning of her appointment, she calmly telephoned that she was compelled to accompany her husband to Boston, and could not come. My explanation that she would be compelled to pay for the time reserved, while it unquestionably irritated her husband, failed to change the patient's plans. The account was settled, and I never expected to see the patient again. On October 4th she landed in New York and telephoned to inquire if I could see her at once, as she had been in great agony from the tooth since the time of her departure from Europe. Fig. 2 shows the marked increase in the abscessed area since March. Fig. 3—this radiograph having been taken October 6th—shows the same condition, with a sterile wire passed through the apical end of the root into the abscess in order to be certain that the broach led to the very

FIG. 1.

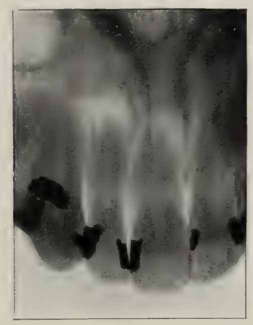


FIG. 2.

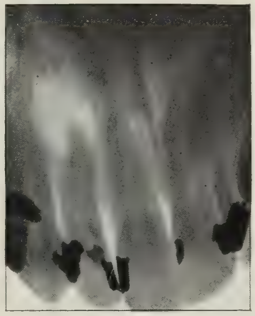
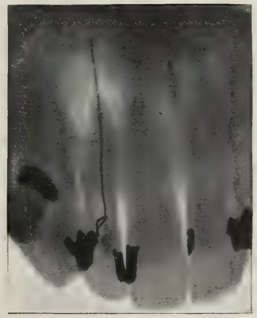


FIG. 3.



end of the canal. Upon examination the tooth was found to be very sore to the touch. Considerable swelling had started above the root, leading to the floor of the nostril. Her nose and face were badly marred by numerous eruptive sores. A small abscess had commenced to develop under the left lower eyelid, and the patient was now convinced that it was a serious mistake to have allowed "her dog to lie asleep" so long. The usual opening was made into the pulp-chamber from the lingual side, and by means of a fine broach the canal was not only explored to the end of the root, but the broach was found to pass readily into the abscess cavity. Extremely foul-smelling, thick and viscid pus at once flowed down and through the lingual opening. This was allowed to remain open and drain for an hour, affording the patient the usual marked relief. A dressing of cresol and formaldehyd—Buckley's formula—was then loosely placed in the pulp-chamber and sealed with cement. This failed to produce the comfort which it generally affords, and which I had expected. She passed a wretched night, and on the following day, upon the removal of the dressing, there followed a discharge of pus not so viscid but fully as copious as before. The third radiograph was then taken and another similar dressing sealed into the pulp-chamber. The pain diminished, but there still remained very considerable tenderness when the patient was seen two days later. The discharge was now of a distinctly watery character. Sodium and potassium compound was now freely used to destroy whatever organic tissue remained in the canal. This was then washed out with the usual one to five hundred solution of mercuric bichlorid in Marchand's hydrogen dioxid. The zinc anode was then introduced into the canal, connected with the electric rheostat, and electrolysis induced; one milliampere of current was passed into the abscessed area for ten minutes. Aseptic cotton was then sealed in the canal, and for the first time the patient reported absolute comfort.

At a subsequent sitting the electrolytic action of the zinc was again used in the same way, and the end of the root-canal was sealed with chloro-percha and a small gutta-percha point forced through the apical opening, and after being thoroughly packed this in turn was covered with oxychlorid of zinc. Later the tooth was bleached, and is now in a strictly aseptic condition, the abscessed area having been entirely destroyed by the electrolytic therapy.

The dramatic character of this case renders its educational value very high, and is my excuse for introducing it.

DR. HUNTER'S JUST CONDEMNATION OF INJUDICIOUSLY APPLIED CROWN AND BRIDGE WORK.

A number of other dental editors have been especially severe in their criticism of Dr. Hunter's diatribe against crown and bridge work. Permit me to quote exactly what he summarizes concerning this class of dental operation, and in the very first sentence you will find that he has a thorough appreciation of such work if properly done. He says:

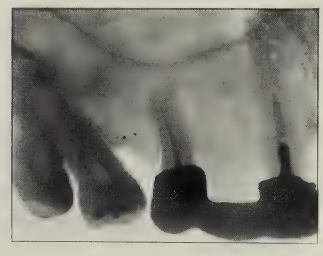
> No one has probably had more reason than I have had to admire the sheer ingenuity and mechanical skill constantly displayed by the dental surgeon. And no one has had more reason to appreciate the ghastly tragedies of oral sepsis which his misplaced ingenuity so often carries in its train. Gold fillings, gold caps, gold bridges, gold crowns, fixed dentures, built in, on, and around diseased teeth, form a veritable mausoleum of gold over a mass of sepsis to which there is no parallel in the whole realm of medicine or surgery.

In this arraignment of dental malpractice, does he not commence by acknowledging his admiration for good dentistry? Does not his criticism apply to "misplaced ingenuity" in building structures on "diseased teeth?" It would not be surprising to find the uneducated and unscrupulous dentist objecting to language such as this, but it is disheartening to find the majority of editors of dental journals lining up on the side of ignorance and malpractice. Dr. Hunter very likely is no expert in the knowledge of dental technique; there is no need that he should be. He has, however, sharply defined the line between the dentistry which he admires and that which is constructed upon diseased teeth. The picture may not be pleasing to look at, but it is true, every word of it.

A PRACTICAL ILLUSTRATION.

The recital of a practical case may render this clearer. Last winter, a navy officer sent his wife to me in order to see if I could repair and improve a fixed bridge in her mouth. The bridge extended from the right second bicuspid to the left canine, these two teeth forming the distal abutments. The gold had broken between the right central and lateral, which was the real cause for her seeking dental treatment. Three radiographs showed the following condition: Imperfect root-fillings in every root-canal except the upper left canine, the last indicating that the operator was capable of doing correct work. In Fig. 4 a blind abscess will be seen over the right second bicuspid and canine. In Fig. 5 the abscess is again shown over the right canine as well as over the right lateral and central incisors. In Fig. 6 is shown the left canine with a correct root-filling, but there are two abscesses over the two bicuspids in which the pulps have not been properly removed—in order to make the "septic traps" at the ends of the roots equilateral. The work had been in position but a short time, and the patient had as yet felt no discomfort from the septic absorption.

FIG. 4.



After explaining to the husband the pathologic symptoms and the necessity for placing all of these roots in a healthy condition if he desired to conserve the life of his wife, it was evident to me that I was looked upon as a plumber who was endeavoring to remove a competitor's work and insert his own for purely mercenary reasons. He blandly told me he might do what I recommended at a later time, but now he wanted the bridge repaired in order that his wife might obtain sufficient benefit in point of time of usefulness for the amount of money he had expended. When I absolutely refused to do anything without first placing the roots in a healthy condition, he retired in astonishment and very much irritated. I could corroborate Dr. Hunter's statement with descriptions of case after case of this character, and most of us have seen cases far worse than this one.

FIG. 5.

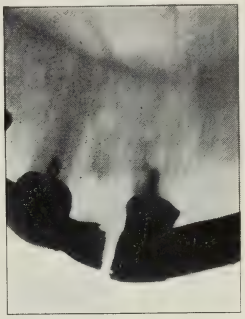
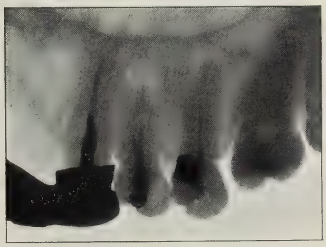


FIG. 6.



ASEPTIC ROOT-CANAL TREATMENT URGED.

If such be the facts, then, let us acknowledge them honestly, and in attempting to drag ourselves from this quicksand of dishonor, let us not forget that instead of criticism we owe Dr. Hunter a debt of gratitude.

When we consider the diversified nature of the etiology of such infections, it should require but little argument to show that when a pulp is removed intentionally, or because it has already died, it is essential that every shred of organic material or residue should be destroyed and removed.

The dentist should learn to forget the antique methods of preserving dead pulp tissue, and become familiar with a scientific method of obtaining strictly aseptic conditions. Each operator must perfect such a technique as suits him best. It is essential, however, that he should thoroughly understand the reason for each procedure, and the nature and action of every therapeutic agent employed. The method successfully used by the writer has been fully described in the DENTAL COSMOS for September 1911. The writer is only too happy to give any detailed information on any point that may seem obscure, in the hope that some progress may thus be made in standardizing this important operation.

[See also *Discussion*, as reported under "Proceedings of Societies," this issue.]

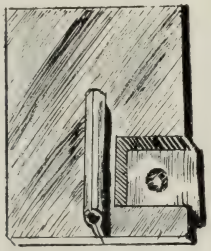
A NEW SYSTEM OF SCREW BRIDGE WORK.

By K. N. ARAKI, New York City, N. Y.

IN applying bridge work in a mouth that presents devitalized teeth for the supporting abutments, there is but little difficulty in fitting up the bridge by the usual procedures, but this is not always easy when the supporting teeth are still perfectly sound. The difficulties in this case lie in the fact that as the natural consequence of the loss or extraction of teeth, the osseous wall of the alveolar sockets gradually undergoes atrophic changes, inducing the approximating teeth to incline toward the point of weakened resistance, thus assuming a dovetail aspect. In order to utilize such teeth for the supporting points of the bridge work by the ordinary technique, it is necessary to grind off a considerable portion of the sound teeth to allow the fitting of the bands to the gum margin. This grinding of the teeth no doubt entails many inconveniences and much pain to the patient, and a method which renders such grinding unnecessary is indeed of great advantage. This advantage is assured by the screw bridge system, first advocated by Dr. E. L. Townsend.

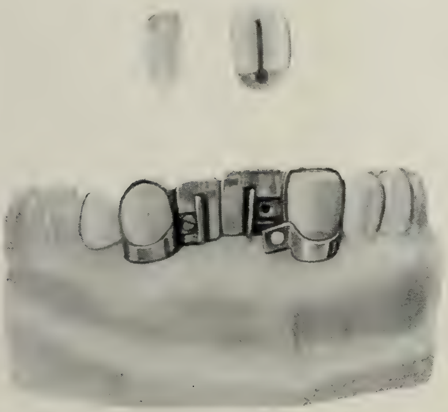
This system consists of a set of gold dummies, from both lateral edges of which two bands of gold sheet project. In setting the bridge, these bands are used to embrace the gingival margins of the supporting teeth, and are there attached to the buccal surface of the dummies by means of screws. Dr. Moore modified the Townsend system by substituting porcelain facings for the gold dummies. In this appliance first the supporting bands are screwed to the smooth labial surface of the backing. In order to attach the porcelain facing to the backing thus prepared, Moore grinds out a portion of the posterior surface of the porcelain tooth so as to conform with the eminence formed by the screw which is holding the supporting bands on the backing. Moore also solders a platinum wire across the pins of the posterior surface of the porcelain tooth in order to insure a stronger attachment to the backing. From my own experience I find that the grinding of a groove in the back of the porcelain facing, especially if it is of narrow dimensions, weakens the porcelain considerably, and is liable to cause a check or crack during further manipulation. By the application of strong heat during the soldering of the platinum wire to the pins, the porcelain is often broken—and it is not always easy to select a shade that matches the natural teeth in color and size.

FIG. 1.



During the last several years I have been using a method which renders the grinding of the back of the porcelain facing unnecessary. At the same time I have adopted Steele's porcelain facings for dummies, for the reason that the soldering of the platinum wire to the pins of the usual porcelain facing can be dispensed with, and the attachment is much more simple and practical, and equally effective. In my opinion an interchangeable facing is always to be preferred to the other variety, and should be used whenever permissible.

FIG. 2.

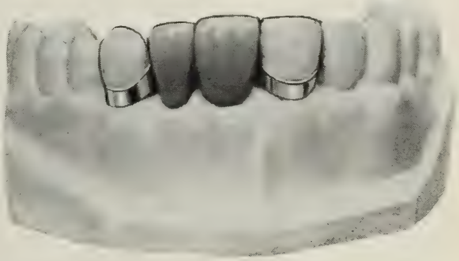


The steps of the technique of making the backing devised by me may be described as follows:

PREPARATION OF THE CROWN OR BANDS.

First method. The impression is taken in plaster as usual. When the supporting teeth converge, a core is employed. After preparing the model, the operator proceeds to make two metallic dies, the one representing the lingual, the other the labial side of the abutment teeth. Two strips of 22-karat gold plate of No. 30 gage are placed upon each of the two dies, and then a semicircular band corresponding and conforming with each half of the supporting tooth is stamped out. The superfluous portion of the gold plate is trimmed off, and the two semicircular bands are soldered together at one corresponding end, leaving unsoldered the ends where the backing is to be joined later.

FIG. 3.



Second method. The usual seamless method.

Third method. The gold plate is pressed down tightly around the solid metallic model of the abutment tooth.

PREPARATION FOR MAKING THE BRIDGE.

The crowns or bands are now placed on the abutment teeth, bound tightly to the latter by means of a fine copper wire, and then a plaster impression and a wax bite are taken. The crowns are again removed from the teeth, and placed within the impression before making the plaster model. The model is then set up in an articulator, in order to ascertain the correct occlusion. Suitable porcelain teeth are then selected and are ground to the model.

BACKING.

For making the backing according to my method, an ordinary Steele's backing is selected, and a square piece of gold plate of No. 26 gage is soldered on to the back of the backing. A dovetail or square box is then cut out in the portion near the gingival margin where the crown or band is to be attached. After this another piece of gold plate of No. 26 gage is soldered on the back, crossing the square or dovetail opening just prepared. The piece of gold plate covering the opening is cleaned and a hole of about No. 18 gage is punched in its center with a plate punch. The Steele backing assumes now a different aspect, exhibiting a square or dovetail depression with a central hole. This depression is intended to receive the correspondingly shaped back of the crown, without protruding.

INVESTING AND SOLDERING.

The backings are then fitted to the model, each one being secured in its correct position with hard wax. All the backings are then removed together from the model, invested as usual, and soldered. Before soldering, the hole of the depression is filled up with a solid carbon stick —from a lead pencil of No. 18 gage— in order to prevent solder from stopping up the hole. It should be mentioned that while securing each backing in its proper position with hard wax, it is necessary in case of a posterior bridge to fit the cusps on the backings. This is not necessary, however, in an anterior bridge. The finished product represents a bridge with a supporting crown on each side. The next step consists in attaching to the free end of the crowns a square or dovetail piece of strong gold plate to conform with the depression in the backing. This counter-piece is easily made by soldering together two pieces of gold plate of No. 26 gage, cutting them to the shape of the depression, and finally punching a hole in the center. The holes in the backing and counter-piece of the crown are then threaded as usual by means of a tap. A male screw, usually of No. 15 gage, fitting the threaded holes, is then prepared.

IMMUNITY AND SUSCEPTIBILITY OF THE TEETH TO CARIES.

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As members of the dental profession we hear the criticism that we are accentuating the wrong side of our profession, that we are putting our greatest efforts and endeavors in the perfection of our reparative measures, and that we pay but little attention to the question of the cause of the various dental diseases. Our attention is called especially to the fact that we constantly are dealing with the ravages of caries of the teeth, yet at the same time we do not understand the factors which produce caries, nor are we able to eliminate them at will to prevent the occurrence of the disease. In other words, we have not done for this dental disease what Jenner did for smallpox, what Behring did for diphtheria, and what Wright and Haffkine have done for typhoid.

We feel, however, that such a criticism is unfair, and is made by individuals who have no conception of the intricacy of the problem, nor do they in any manner appreciate the character of investigation which has been directed toward this very question. When we look back along the long line of evolution through which our knowledge of this subject has passed, and when we consider the tireless efforts of our dental scientists, who have applied to this problem every known principle of research, we feel that, although the question is not settled, nevertheless the efforts which have been put forth in this direction have been commendable and are worthy of recognition. As long as the science of dentistry stands, the names of Miller, Williams, Black, Kirk, and others who have contributed so largely will live and be honored for the light which these men have thrown upon the subject of the cause and control of caries of the teeth. Each year some new contribution is added to the fund of our knowledge of the subject, bringing us nearer to the true solution of the problem, if such a solution can be found.

EARLY THEORIES REGARDING DENTAL CARIES.

In the earlier periods of our profession the causative factor of tooth destruction in the process of tooth caries was not understood, many theories being held regarding it. There were those who considered caries to be a manifestation of inflammation of the tooth. This theory dates back to very early times—when Hippocrates, in 456 B.C., made the statement that toothache is the result of "the stagnation of depraved juices in the teeth." Later adherents of this theory were such men as John Hunter (1778), Benjamin Bell (1787), Joseph Fox (1816), and Thomas Bell (1831). In more recent times, the inflammation theory has been championed and stanchly supported by Heintzman, Boedecker, and Abbott, who in the '80's wrote much in the substantiation of the claim that the dentin contains circulatory spaces, and that in these inflammatory and suppurative changes occur which are synonymous with caries.

At the same time other notable men, believing that the loss of tooth substance by caries was due to an acid decalcification, maintained that the free acids of the mouth are responsible for the process. Such men as Sir John Tomes, Watt, and Jonathan Taft were strong advocates of this theory, and we have a text by E. Magitot, written in 1878, in which he describes the process of caries as being due to the free acids of the mouth.

Leber and Rottenstein, in 1867, called attention to the probable causative association of bacteria with some phases of caries. By staining carious dentin with iodin, the dilated dentinal tubuli were shown to be filled with granular bodies which they recognized as bacteria. At that time no means for the isolation and identification of bacteria were known, and they could carry their investigations no farther. At the World's Medical Congress, 1881, Milles and Underwood reported their investigations of the subject, and stated as their belief that caries is the result of decalcification produced by acids secreted by certain bacteria.

MILLER'S WORK.

It remained for Dr. W. D. Miller, who was a firm believer in the germ theory, to demonstrate conclusively the validity of that view. Familiar as he was with the work of Dr. Koch, as soon as the process of isolating and identifying bacteria was made a certainty, Dr. Miller applied these principles to the bacteria of caries and established his hypothesis. His conclusions were that caries of the teeth is the result of decalcification of the tooth substance by lactic acid, and that this acid is the result of fermentation of carbohydrates; that this lactic acid fermentation is produced by a large number of bacteria which are common in the flora of the mouth, and that the carious process always begins on the exterior of the tooth and never in the interior.

This work of Dr. Miller is without doubt the most valuable contribution to the subject of caries that has ever been made. His labors were so painstaking, and his conclusions were so completely proved that, although they have often been contested, they have never been refuted to this day. They therefore stand as a foundation upon which all of the subsequent observations have been builded.

Granting, then, that the findings of Miller are true, and that we do understand the process by which the tooth is destroyed by caries, the dental profession is still confronted with a seemingly greater question—namely, the factors which determine that one tooth shall suffer caries while another will not, or the factors which make certain mouths immune to caries while others are strongly susceptible. It is this question of the immunity and susceptibility of the teeth to caries, with the ascertaining of methods of procedure whereby immunity may be established in the mouths that are susceptible to caries, that stands today as a challenge to our profession for solution.

CAUSES OF VARIATIONS IN SUSCEPTIBILITY TO CARIES.

The variations in susceptibility to caries of certain teeth or sets of teeth must depend upon two factors: First, the internal resistance of these teeth to the carious process; and second, the strength of the external attacking force. The statement is often made that certain teeth are "soft," and therefore suffer caries. In his researches, in 1895, on the "Physical Characters of the Human Teeth," Dr. G. V. Black investigated the strength of a large number of teeth, and states as his conclusion that—"neither the density of the teeth nor the lime salts they contain has anything to do with the liability of the teeth to suffer from caries." Dr. Miller also attacked this problem experimentally, and found that the dentin of different teeth was decalcified by the acids of caries at differing rates, and that some enamels were more resistant than others. This difference is not great enough, however, to determine immunity. He calls attention to the fact that in the interproximal space caries frequently attacks one tooth much more vigorously than the other, or may fail to produce any effect upon one, while the other suffers extensive loss of tissue. In this connection he says:

"This resistance depends to a certain extent upon the structure of the tooth, upon the perfection of its external enamel crust, the enamel cuticle, and upon its freedom from fissures, bruises, cracks, or weak lines such as are produced by uncalcified prisms."

Röse in Germany and Förberg in Sweden have made extensive investigations as to the condition of the teeth of the children. They both state that the children who live in localities in which the soil and water are rich in calcium salts have teeth which are well formed, are hard, and have little caries, while the inhabitants of communities in which the soil and water are poor in calcium salts have poorly formed teeth which are very prone to caries.

It may be seen, therefore, that the question of how much influence the resistance of the tooth plays in the process of caries is not definitely settled, there being a diversity of views. It is possible that certain teeth by their form, structure, and perhaps vital force, may resist the action of caries to a considerable extent. It is not probable, however, that these structural or physical characteristics of the tooth are transitory, but are largely constant until affected by some external influence. They therefore cannot account for the sudden changes from susceptibility to immunity, or *vice versa,* which we see occurring in the mouth. We must look, then, to the second class of factors—those without the tooth, which have to do with the virulence of the attacking force—and seek in them the solution of our problem.

In a consideration of the factors of caries which are external to the tooth, we distinguish three classes: First, the micro-organisms which produce the lactic acid fermentation; second, all the food in the saliva upon which these bacteria may live and produce the necessary acid; and third, those influences which may help or hinder the growth of the bacteria.

MICRO-ORGANISMS.

It was clearly shown by Miller that no one organism was responsible for the production of caries, but that ten varieties were commonly found in the mouth any one of which might produce lactic acid when acting on carbohydrates. He also states that, in his investigations, those who were immune to caries had the same organisms present in their mouths which were to be found in the mouths of the susceptibles. In a number of cases, however, the virulence of the fermentation was greater in the susceptible saliva, but this difference was not constant enough to be looked upon as a controlling factor.

It was first pointed out by Williams, and later corroborated by Miller, Black, Kirk, and others, that the growth of the bacteria of caries usually takes place beneath a thin plaque or film, the plaque confining and intensifying the action of the acids formed. Although its presence has been well demonstrated, still by reason of its thinness and transparency the plaque has resisted the efforts put forth in the endeavor to determine its composition and the method of its formation. It has been spoken of as "gelatinous," "glutin-like," "zoöglea," etc., by various observers, but has been generally considered to be the product of the bacteria of caries, thrown up for their protection. Another theory has been advanced lately by Kirk, in which he claims that the plaques are formed of mucin, and that this mucin is precipitated from the saliva by the lactic acid produced by the bacteria.

The office of the plaque seems to be that of protection of the bacteria from dislodgment and the confining of its products against the surface of the tooth. Were it not for some such agent the bacteria would soon be washed away, or the acids which they produced would be diluted by the saliva, so that they would have little or no effect upon the tooth. As stated by Black, 98 per cent. of all caries occurs upon three definite locations on the teeth, namely—(1) pits or fissures of the occlusal surfaces, (2) approximal surfaces, and (3) the gingival third of labial or buccal surfaces. This fact is probably due to the limiting action of the plaque.

Bacterial plaques may be located by painting the teeth with a solution of potassium iodid. It will be noticed in the average mouth that plaques are present upon surfaces of the teeth which never decay, and that the mouth of an immune will often have as many plaques as that of the susceptible individual. From this we might infer that lactic acid fermentation does not always occur beneath a plaque. In fact it is possible that putrefactive rather than fermentative changes may take place, in which case the tooth would be protected from caries.

FOODS FOR BACTERIAL GROWTH.

The foods upon which the bacteria live and form their products are derived from three sources—the saliva, the foods taken into the mouth from without, and the substance of the tooth itself. As shown by Miller, lactic acid fermentation is dependent upon carbohydrate as a food, so that it is the carbohydrate element of the saliva, foods, and tooth substance to which we must give our attention.

Carbohydrates. The carbohydrates in the saliva, outside of those which are ingested, are very limited. The only possibilities which we can see lie in the mucin and the glycogen, each of which have been the subject of much discussion.

Mucin. This is a gluco-protein containing nitrogen. It is secreted by the parotid, submaxillary, and buccal glands, and is found in varying quantities in the mixed saliva. The reaction of mucin is slightly acid, and, as has been brought out by Kirk, the mucin secreted by the buccal glands may contain acid phosphates of sodium and calcium which will produce erosions and caries at the necks of the teeth. Mucin, because of its carbohydrate radical, may undergo lactic acid fermentation, and in many cases probably furnishes food material for a considerable acid production. It is possible, then, as stated by Kirk, that these same acids may precipitate other fresh mucin to form a protective and nutrient plaque over the lactic acid organism, binding it to the tooth. Such a process as this may have the power to produce caries. That this does not always occur is seen in the fact that many mouths have a superabundance of mucin, but the teeth are immune to caries. There is, nevertheless, no doubt that the mucin of the saliva is a considerable factor in the process of caries, in that by its presence it interferes with the prophylaxis of the mouth, favoring the retention of foodstuffs about the teeth, and may itself furnish food material for lactic acid fermentation.

Glycogen. This is a carbohydrate formed in the liver from ingested carbohydrates, and from proteins containing carbohydrate radicals. In a paper entitled "Sialo-semeiology," in 1900, Michaels asserted that glycogen is frequently found in the saliva of young people, and that, acting as a food for bacterial fermentation, it has a direct relation to caries. Hammarsten states that glycogen may appear in the saliva in certain pathological conditions and is usually derived from diseased bronchial passages. The causative factor of glycogen in the process of caries is combated by Miller, who conducted a number of experiments investigating the action of fermentation on glycogen. His conclusions were that glycogen does not occur in the saliva in a sufficient quantity to undergo a lactic acid fermentation. He closes his remarks upon this subject with these words: "The results of all my investigations seem to fully justify the conclusion that no fermentable substance of the group of carbohydrates occurs in the saliva in sufficient amount to materially influence the progress of caries."

From this we see that our knowledge of the food elements of the pure saliva which are capable of lactic acid fermentation is very vague and that the matter is still debatable. There is need for further investigation of these two elements, mucin and glycogen, that their relation to caries may be established or disproved.

Ingested foods. There is little doubt that the process of caries is affected by the quantity and character of the food ingested. Of our mixed diets of protein, carbohydrates, and fats, it was clearly shown by Miller that the carbohydrates, starches and sugars, were the only foods which were capable of lactic acid fermentation. The starches must first be reduced to sugars by the action of the ptyalin of the saliva, and then the combined sugars form an admirable breeding-place for lactic-acid-producing bacteria. Without these carbohydrates caries could not occur. This recalls the classic illustration of the principle—namely, that the Eskimos, who live entirely upon meat, fat, and oil have almost no caries. We are all familiar with the other extreme as seen in the case of millers and candy-makers, in whose mouths carbohydrates are always present and the ravages of dental caries are extreme.

Kirk lays special emphasis upon the character of food substances present in the mouth. He attributes the prevalence of caries in children to the excess of carbohydrates in their food, the carbohydrates being found in biscuits, candy, and many soft foods which they commonly eat. In this connection he says: "I regard the absence or insufficiency of carbohydrate material in the salivary composition as one of the important, if not most important, factors in immunity to dental caries."

The amount of carbohydrates which remain in the mouth to be food for the bacterial growth stands in a direct relation to the oral hygiene. In some cases large amounts of carbohydrates are ingested but only a little remains in the mouth, while in other cases the process is reversed. This subject will be taken up a little later.

Foods in tooth substance. It is not probable that there is any appreciable amount of food in the enamel which the organisms of caries can use. So that, for the invasion of the enamel, the bacteria must depend upon the materials brought them by the saliva. When the carious process reaches the dentin, it finds a certain amount of nutritive material which enables the infection to travel deep into the interior of the tooth. This has been shown by experiments upon living animals in which cavities were drilled in sound teeth, infected with caries organisms, and the orifices hermetically sealed. In this manner all the carbohydrates of the mixed saliva were excluded. A later investigation showed that extensive caries had taken place, the organisms having thrived and produced their acid.

INFLUENCES WHICH HELP OR HINDER THE GROWTH OF THE BACTERIA OF CARIES.

For the proper growth of the carious process, certain conditions are necessary—namely, *lactic acid bacteria must be present, the bacteria must be protected from dislodgment, proper food must be provided, and the acids which they produce must be confined against the surface of the tooth.* Any influence which will affect this chain of factors will either help or hinder the process of caries. In the consideration of this phase of the problem we are confronted by a seemingly endless number of factors which may have a bearing upon the growth and life-history of the organism of caries. A very large class of important influences may be considered under the head of "oral hygiene."

Oral hygiene. This is *the science of health and its preservation in the oral cavity, with special reference to caries of the teeth.* Perhaps the most potent factor in dental diseases is uncleanliness of the oral cavity, so that the term "oral hygiene" has become synonymous with oral cleanliness. Absolute cleanliness of the mouth would mean that all foodstuffs and foreign matter be removed, and that the oral cavity be made sterile. In such a condition the teeth would be bathed in a sterile solution of mixed salivary secretion, and obviously no caries would occur. Absolute cleanliness of the mouth cannot be accomplished, and an approximation thereto can only be maintained a short time. The mouth cannot be kept sterile, nor can we remove all traces of foodstuffs from the saliva and the teeth. The matter of mouth cleanliness is therefore relative, and in so far as we depart from the condition of perfect cleanliness do we introduce the factors which militate against the health and welfare of the tissues of the mouth.

Many mouths are said to be "self-cleansing." That is, relatively little food material remains about the teeth at the completion of a meal. Such a condition is dependent upon a thorough mastication of the food ingested and the character and quantity of the saliva.

Cleanliness by mastication. By thorough mastication we mean the division of the food into minute particles and the trituration of it with the saliva. This process not only reduces the food to a consistence in which it will be most readily acted upon by the digestive juices, but also serves as a most potent cleansing agent for the teeth. Let an individual live upon soft foods entirely, never using his teeth to masticate hard substances, and they will soon become coated with food and mucoid deposits, in spite of all that he can do with brush and dentifrices.

Thorough mastication and the subsequent self-cleansing can only be accomplished in a mouth in which the anatomical structure and arrangement is of good character. The occlusion of the teeth must be near the normal. The teeth themselves must be well formed, with hard, smooth enamel, and free from deep pits and fissures. The approximal surfaces must be well contoured to form clean definite "point contacts," rather than the flat "surface contact" which tends to retain the food in the interproximal space. High and definite marginal ridges are needed on the molars and bicuspids to divide the food and to protect the interproximal space from an excess of food material. In such a mouth all the surfaces of the teeth which are vulnerable to caries are rubbed continually during mastication by the excursions of the food across them. In this manner plaques which may have been formed will be rubbed off, and decalcification by caries will be averted.

We all are familiar with such a condition as has just been described, and know that it is typical of many cases of immunity to caries. We also know the mouth with irregular teeth which have few occluding surfaces, teeth with cavities, teeth with flat approximal contacts, and teeth with approximal fillings which have no proper contour, point contact, or marginal ridge. In such cases we usually find quantities of food material constantly about the teeth and the ravages of caries very evident. It is a very significant fact that when such a case as the last mentioned is treated according to the best methods of modern dentistry, when every tooth is given a proper contour, when point contacts and marginal ridges are rebuilt, the patient frequently ceases to suffer from caries and enters the class of immunes.

The work of Dr. Black in his propaganda of "extension for prevention," and the work of D. D. Smith and his followers in that of prophylaxis, have shown us conclusively that proper tooth contour and strict prophylaxis will prevent caries in a large number of individuals, and furnish us with a great factor which must be recognized in the establishment of immunity.

But great as the factor of cleanliness is, we cannot overlook the fact that caries is seen frequently in mouths in which the strictest prophylaxis is maintained, while the converse is equally true, namely, that many filthy mouths are perfectly immune to caries. Cleanliness is therefore a factor in the determination of the conditions of immunity and susceptibility, and in some cases is the controlling factor, while in many other instances it is but one of several influences which, by their combined effects, produce a condition which is favorable or unfavorable to caries.

The question then naturally arises, What influences other than those which have been mentioned are there that are capable of determining the action of bacteria with respect to localized lactic acid formation? In the quest for this other substance every component of the saliva has been investigated, and estimations have been made as to their possible effects. Of the salivary constituents the one which has received the most attention especially in late years has been the potassium sulfocyanate. Extensive investigation has been directed toward this principle, and the work is still being carried on.

POTASSIUM SULFOCYANATE IN THE SALIVA.

This salt occurs in the saliva in exceedingly small quantities. Data from various observers state percentages ranging from 0.00016 to 0.041 as being found in normal salivas. Little is known as to the source or physiological function of KCNS, and until recent times little importance has been attached to it. Michaels called attention to the relation of the chemical and physical conditions of the saliva to the various disorders of the general metabolism. He makes the statement that the alkaline sulfocyanids prevent putrefaction, and therefore arrest caries. This phase of the problem has been taken up by Dr. Low, Dr. Waugh, and many others, who claim that their results show an absence of KCNS in the salivas of susceptibles, and that the salt is usually present in the mouths of immunes. They felt that the KCNS had a restraining action upon fermentation or upon the ability of the bacteria to form plaques.

In opposition to this view a number of observations have been reported to the contrary. Tests made in the University of Michigan laboratory among the students did not show KCNS in a large percentage of immunes, while an equally large percentage of susceptibles gave a good test for cyanates. It was also shown that the test for KCNS that was commonly used was not specific, and results might appear positive when no KCNS was present. In a very extensive work done under the auspices of the New York State Dental Society, Dr. Gies of Columbia University reports that his results do not show any relation between KCNS and immunity. The efficacy of KCNS in its power to control caries is still unproved.

Three other constituents of saliva should be mentioned as having received special attention regarding their relation to caries—namely, pytalin, the general acidity of the mouth, and the alexins.

PTYALIN IN THE SALIVA.

Ptyalin is an amylolytic ferment which is found in all salivas. It has a direct influence upon caries in that it reduces starch compounds to a form in which they may undergo lactic acid fermentation. It was asserted by Hinkins that ptyalin not only reduces the starches to sugars, but also forms lactic acid, and in this manner produces caries without the aid of the bacteria. In refutation of this theory, Miller published the results of his experiments, in the issue of the DENTAL COSMOS for November 1905, and made the statement that ptyalin acting upon carbohydrates never forms acid in sterile solutions.

GENERAL ACIDITY OF THE MOUTH.

The free acids of the mouth, such as fruit acids, acids of vomitus during pregnancy, and acids formed by fermentation of the saliva have been held by some as a causative factor in dental caries. It is very evident that, if the total acids of the saliva were able to produce caries of the teeth in and of themselves, the cavities would not be localized, but would extend over the whole surface of the tooth. The total acidity of the saliva, therefore, can promote caries only in so far as it may help or hinder the growth of the lactic acid organism. In the investigation of this point it was found that the growth of the organisms producing lactic acid was more rapid in alkaline than in acid media. It is true that in acid media there is some acid present at the beginning of the fermentation which will augment the acid formed, but the growth of the organisms is so much more rapid in the alkaline media that it more than compensates for the difference in a very short time. Hence we see that the free acids of the mouth do not accelerate the progress of the caries. It is possible that in certain cases the acids may roughen the surface of the enamel, affording a surface which is more favorable for the attachment of the plaques, and thus inducing the inauguration of caries. After the plaque has formed, and the caries begun, it is thought that the reaction of the media has no effect upon the process.

ALEXINS IN THE SALIVA.

It has been suggested that there may be in the saliva certain anti-bodies which are similar to those found in the blood, and that these anti-bodies are capable of controlling the growth and activity of the lactic acid bacteria. Many manifestations of caries lead us to suspect that some such agent may be present in the saliva, exerting a control over the process. Little work has been done in investigation of this possibility. Miller has stated as his belief that no anti-bodies exist in the saliva which are capable of controlling the bacterial growth, but says that the subject should receive more investigation.

CONCLUSIONS.

From the foregoing we see that our knowledge of the subject of immunity and susceptibility of the teeth to caries is made up of a heterogeneous collection of facts, pseudo-facts, and theories, so that we can agree with Dr. Kirk, who says that the whole process is still a sealed book.

The manifestations of susceptibility of the teeth in our patients to caries are familiar to all of us. We find that caries of the young runs riot, and that when the age of maturity is reached the teeth are no longer attacked by caries with the same severity. Then, in middle-aged individuals who have had no caries for many years a number of cavities suddenly appear in their teeth. This change in susceptibility may or may not be accompanied by a change in the general health of the individual. These changes from immunity to susceptibility and *vice versa* are in their nature so obscure that they remind us of nothing so much as that general property of the body which determines its resistance against infections. The existence of such a substance in the saliva, with its nature and its source, is yet to be demonstrated.

Much as we are inclined to look for this intangible something which we can point out as the predominating factor, we cannot but admit it to be more probable that the process of caries does not depend upon any one factor, but is a result of several factors acting in the same or in opposing directions. Some of these forces have been pointed out in this paper, and attention has been called to their relation to the process of caries. It has been seen that caries is directly dependent upon the amount of infection present in the mouth, upon the carbohydrate food element habitually remaining about the teeth, and also upon the masticatory efficiency of the mouth and teeth. Added to these may be the influence of the structure of the teeth, and the reaction and composition of the saliva. These forces work together to produce or to hinder the progress of caries. We are not at all certain that this is a complete list, for it is very possible there may be some other substance or substances which are more potent in the determination of the growth of the carious process than any of those mentioned.

We do know, however, that by proper mouth prophylaxis, by the best modern reparative measures, and by the regulation of the diet, we may restrict the action of caries in the average individual. Thus, by mechanical measures, we produce a partial or complete immunity, in spite of unfavorable conditions which may be existing in the mouth. Until a better method be found we must continue to fight caries by the best prophylactic and reparative measures which we can command.

In the meantime the subject must be left an open question. Investigations should be carried on by every man who is able to give the matter his attention, and his results should be published in such a manner that they may be of aid to other investigators and instructive to the practitioner of dentistry. Let us, then, work together, following the slogan of the COSMOS—"Observe, compare, reflect, record"—and strive toward the goal of a fuller understanding of this great question.

EXPERIMENTAL ORAL EUTHENICS:

An Attempt Objectively to Measure the Relation Between Community Mouth Hygiene and the Intellectual Efficiency and Educational Progress of Elementary School Children.

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(Continued from page 413.)

Part II: Results.

In order to measure the gains made in the various tests during the course of the experimental year, recourse may be had to four criteria or indices of improvement. (How the index of improvement, *f*, is obtained is explained in connection with the tables—see page 553.)

First index. This is obtained by averaging the amount of improvement in *all* the sittings, and is represented in the tables by 2–6 in the last column but one, and by the dot above 2–6 in the graphs of improvement. This index gives the following percentages of increase in the five tests:

	Per cent.
Memory	7
Spontaneous association	15
Addition	9
Antonym	31
Perception	14

Average, 15.2 per cent.

In these tabulations the indices are converted into per cents. of improvement, as explained in connection with Table I. The tests were given in the order in which they are listed in the tables.

This index, which averages the improvements from the second to the last sitting, provides a valuable means of measuring the relative growth in efficiency made by different individuals, or by different homogeneous or disparate groups of individuals, within equal periods of time; but it does not afford a satisfactory criterion by which to evaluate the influence of a determinate factor, such as the mouth treatment in these tests, which has been injected into a later stage of the series of tests. To measure the influence of such a factor, the records made *before* and *after* its incidence must be separately tabulated and compared. This may be done in at least three ways.

Second index. We may compare the efficiency scores and the corresponding improvement indices in the *initial* sitting, 1, with those in the *final* sitting, 6. These efficiency scores appear, respectively, in the columns numbered 1 and 6 in the tables, and are plotted above 1 and 6 in the *efficiency* graphs (the efficiency graphs are all marked *a*). The improvement indices appear in the fourth column from the last in the tables, and are located by means of a dot at the proper height over $\frac{6}{1}$ in the *improvement* graphs (series *b*). Measured by this index the percentages of improvement are as follows:

	Per cent.
Memory	11
Spontaneous association	78
Addition	44
Antonym	224
Perception	73

Average, 86 per cent.

But this basis of comparison is not very satisfactory. First, because it is likely that pupils do not ordinarily do themselves full justice in the first sitting in an experimental series. Indeed, an examination of the data shows that the *smallest efficiency* scores were made in the first sitting in three of the tests—spontaneous association, associating antonyms, and perceptual discrimination; in the second sitting in one test, memory; and in the third sitting in one test, addition. In the same way, the *largest gains* (indices of improvement, *f*) were made in the second sitting ($f\frac{2}{1}$) in two tests, spontaneous association and associating antonyms; in the third sitting ($f\frac{3}{2}$) in one test, memory; and in the fifth sitting ($f\frac{5}{6}$) in two tests, addition and perception. On the other hand, the *smallest relative gains* (or, in some cases, the largest losses) were made in the sixth sitting in three tests, addition, associating antonyms, and perception; in the third sitting in one test, spontaneous association; and in the second sitting in one test, memory.

It is therefore apparent that the *initial* efficiency is more satisfactorily represented by the average of tests 1 and 2 than by 1 alone, or indeed by 2 alone, although 2 alone would probably be preferable to 1 alone.

In the same way, secondly, the gain can probably not be satisfactorily expressed by the result of the *terminal* sitting alone, because the knowledge that this was the last sitting would tend to incite the pupils to put forth unusual efforts—make a superb final spurt. This would thus tend to exaggerate the improvement—as is indeed shown by an examination of the efficiency graphs. The largest scores occur in the sixth sitting in all except the spontaneous association test (fifth sitting). On the other hand, the largest relative gain was not made in the sixth sitting, as we saw above, but in the second, third, and fifth sittings, so that the "final spurt" was less pronounced than might have been assumed. On the whole, however, the averaging of 5 and 6 (or 3, 4, 5, and 6) will yield a more reliable terminal index than 6 alone.

Finally we are more liable to obtain equality in the difficulty of the test materials of the same series used before, and in those used after (or during) treatment, by averaging the results of two or more sittings; *i.e.* by averaging the tests in the first two sittings for the initial efficiency, and the tests in the last four, or last two, sittings for the final efficiency. As already explained in Part I, the effort was made to make the six sets of test materials in each series equal in difficulty, but what appears to be equal in theory does not always prove so in practice.

Third index. Hence our third method is to compare the efficiency in the pretreatment tests (1 and 2) with that in the treatment series (3, 4, 5, 6). The results are so tabulated in columns 7 and 8 (and the following index column) in the tables; in the efficiency graphs they are plotted in the form of a detached oblique line above 1–2 and 3–6, and as a dot above $\frac{3-6}{1-2}$ in the improvement graphs. The length of the oblique line and the distance of the dot on the percentage axes from the base line readily represent graphically to the eye the amount of the gains. The following are the percentages of gains:

	Per cent.
Memory	5
Spontaneous association	49
Addition	16
Antonym	128
Perception	34

Average, 46.4 per cent.

The figures in the antonym test are exclusive of a few abnormal gains, as can be seen by consulting Table IV.

Satisfactory as this method may seem, it is subject to a very material defect inherent in a research of this character. This arises from the fact that the dental work could neither begin nor end on the same dates for all the pupils. As a matter of fact, the dental work had been started in the case of five pupils only in the month in which the second pre-treatment sitting was held (June 1910), and for ten pupils it did not begin until the month in which the first sitting in the treatment series was held (August).

It did not begin till mid-July for over one-half of the pupils (fifteen). It is thus patent that little, if any, orthogenic effect could be expected in the third, or even the fourth test (August 31 and September 21). Accordingly we must have recourse to a fourth index.

Fourth index ($\frac{5-6}{1-2}$). In this the pre-treatment scores (first two sittings) are compared with the post-treatment scores (last two sittings). The last two sittings were held from three to five months after the dental work had been finished. It may therefore be assumed that these two tests came at a time when the orthogenic effects of the treatment had become maximally—or if not maximally, at least conspicuously—manifest. This index is found in the last column of the tables ($f\frac{5-6}{1-2}$), and is represented in the improvement graphs by means of a dot placed over $\frac{5-6}{1-2}$. The improvements are as follows:

	Per cent.
Memory	19
Spontaneous association	42
Addition	35
Antonym	129
Perception	60

Average, 57 per cent.

There is even a certain objection to this index also, due to the fact that the pupils had grown almost one year older between the pre- and post-treatment tests, and may therefore have made certain gains in efficiency which can be ascribed to natural growth—*maturity increments* due to increasing age. Such improvements, however, would be significant because they would tend to show that laggards and repeaters (such as these children were) are enabled to make normal, or at least significant, mental progress during the course of one year through the application of an appropriate orthogenic regimen. At the same time it is pertinent to say that natural improvement, due to increasing age, might very well be counteracted or minimized by the growing irksomeness or monotony of the tests.

In the further analysis of the results all four measures may be utilized, but particularly the third and fourth. There are certain weaknesses in all of them, as has just been shown.

Comparing the more general results it is seen that the average gains for all five tests amount to 15.2 per cent. in the first index, 86 per cent. in the second, 46.4 per cent. in the third, and 57 per cent. in the fourth. The fourth index gives considerably larger gains than the third in three tests (memory, addition, and perception), smaller gains in the spontaneous association test, and practically the same results in the antonym test. *In all indices the greatest improvement is made in the antonym, spontaneous association, and perception-attention tests, and the smallest improvement in the memory and addition tests.*

From the alleged facts that the limits of *memory power* are fixed by heredity for each individual, and that memory is static and relatively unimprovable by training, it is not surprising that the improvement is smallest in this test, or that some pupils actually showed losses which might spring from waning interest, the growing monotony of the test, or fatigue. This is, however, the only test in which an appreciable number of subjects lost in efficiency—a minority loss, although 13 lost, according to the third index, in amounts varying from 4 to 23 per cent., and 8, according to the fourth index, in amounts varying from 5 to 16 per cent. The gains varied much more widely than the losses, ranging from 0 per cent. to 91 per cent. in the third index, and from 0 per cent. to 116 per cent. in the fourth index. It thus appears that, however fixed this mental trait may be, it is subject to improvement through orthogenic measures. The orthogenic effects, however, differ widely with different individuals, at least so far as concerns immediate recall based on memorized digits. Some pupils deteriorate, some remain stationary, while others improve considerably.

In *spontaneous association* five pupils show losses in the third index, varying from 6 to 36 per cent.; but only two in the fourth index, varying from 18 to 43 per cent. The gains, on the other hand, varied from 0 per cent. to 128 per cent. in the third index, and from 2 to 162 per cent. in the fourth index—a considerably wider range than is found among the losses. The individual differences are noteworthy here also, but altogether there is manifest a pronounced quickening of the associative processes in the tests before and after treatment.

In *addition,* losses are suffered by three pupils in the third index, ranging from 5 to 11 per cent., and by one pupil only in the fourth index (13 per cent.). The range for the gains, again, was considerably larger than for the losses, varying from 0 per cent. to 75 per cent. in the third index, and from 6 to 125 per cent. in the fourth index. The improvement in this fundamental intellectual trait, notwithstanding these large variations, is noteworthy.

In *associating antonyms* all the pupils showed marked and consistent gains, varying from 20 to 816 per cent. in the third index, and from 33 to 666 per cent. in the fourth index. (This is exclusive of subject 24, who made zero scores in the first two tests and whose index is abnormally large). The extreme character of the gains made by some of the pupils in this test suggests that the task may not have been fully comprehended by some at the outset, in spite of the very explicit explanations which were made, and that a part of the gains may thus possibly be due to a better comprehension of the test.

Only one pupil lost in the *perceptual discrimination, attention, and manual reaction* test in the third index (4 per cent.), and none lost in the fourth index. The individual gains varied from 10 to 68 per cent. in the third index, and from 19 to 101 per cent. in the fourth index (exclusive of subject 4, who has minus credits in the first two sittings).

We may enumerate seriatim the facts brought out in this research:

(1) Large *individual differences* have been found in all the tests without exception. These differences are quite as striking as the individual differences which have been found in other psychological and pedagogical experiments on pupils of the same age or in the same grade.* Pupils do not profit by oral orthogenic measures in the same degree. It is therefore apparent that experiments of this sort must be conducted on groups of pupils, and the conclusions based on the central tendencies or results. Indeed, the theory of state paternalism in education contemplates the greatest good to the greatest number, either as affects pedagogical or orthogenic measures (medical, dental, or psychological inspection and treatment).

(2) Although there are these individual differences, the character of the *central tendency* is unmistakable. There is a decided gain in every test; the gains are not merely emphatically more frequent than the losses, but the largest gains are invariably decidedly larger than the largest losses. There is only one test (immediate recall) in which the losses are numerous or large enough to become significant. On the whole, we may say that the average child improved about 50 per cent. in all the tests during the experimental year.

(3) The fact that a given pupil improves little or much in one test does not necessarily imply that he will gain much or little in all the other tests. This is strikingly brought out in the following tabulation, in which *A* gives the five pupils in each test who made the smallest gains (the smallest indices of improvement based on the fourth index), and *B* the five in each test who made the largest gains (largest indices). In both *A* and *B* the subjects are indicated by the same numbers which are assigned them in Tables I to V, and the subjects who made the smallest gains among the five are given first (in the line numbered I), and those who made the largest gains last (V).

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* Chambers, "Individual Differences in Grammar-grade Children." *Journ. Educational Psychology,* 1910, vol. i, p. 61; Thorndike—numerous studies; Courtis, "Arithmetical Studies."

(*A*)

Rank.	Memory.	Spont. Assoc.	Addition.	Antonym.	Perception.
I	*s.* 9	*s.* 9	*s.* 18	*s.* 14	*s.* 15
II	7, 17	8	24, 12	1	23
III	26	11	8, 7, 17	2	2
IV	4	13	27	27	20
V	19	17, 27	23	13	9

(*B*)

Rank.	Memory.	Spont. Assoc.	Addition.	Antonym.	Perception.
I	*s.* 12	*s.* 12	*s.* 16	*s.* 3	*s.* 19
II	2	14	19	8	22
III	6	4	1	23	6
IV	8	2	22	16	25
V	16	22	4	4	16

(*s.* = subject.)

It is seen that 19 of the total of 27 pupils are enumerated among the five *poorest* gainers in one test or another—*A*. Of these only three occupied the same relative position (rank) in two tests; and none occupied the same rank in three or more tests. Eleven are enumerated in one test only, five in two tests, and only two in three tests.

Thirteen of the 27 are enumerated in *B*, containing the five in each test who showed the *largest* improvement. Only four of these occupy the same rank in two tests, and none have the same rank in three or more tests. Five occupy one of the five best positions in one test only, five in two tests, two in three tests, and one in four tests. Not a single one of the poorest or of the best pupils were enumerated among the poorest or best in all five of the tests. On the other hand, eight of the pupils tabulated in the first group, *A*, are also tabulated in the second group, *B*. Two of these are enumerated twice in each table (thus showing very poor improvement in two tests and very good improvement likewise in two tests); one once in each table; two twice in *A* and once in *B*; two once in *A* and twice in *B*; and one once in *A* and three times in *B*. Thus several pupils improved very little in one or two tests, but showed great improvement in one or two others.

Nevertheless, it is worthy of remark that of the three pupils (4, 22, and 16) who won a place in three or more of the tests in *B*, and of the three (9, 17, and 27) relegated to a place in three of the tests in *A*, only one, namely 4, is enumerated in both; so that there is manifest a certain amount of positive correlation between the indices of improvement in these five tests. (The index of correlation will be calculated in another serial research, both as regards the efficiency scores and the indices of improvement.) Thus pupils who improve very poorly in *several* tests will not equal the best pupils in improvement in other tests. Such pupils are presumably suffering from pronounced general enfeeblement or marked retardation. However, it is not only possible, but probable, that a child who manifests little or no growth in one or two mental traits may develop not only normally but to an unusual extent in others. It is important that teachers should recognize this fact in training children. The fact that a pupil fails in one or two branches should not necessarily serve to discount his capacity for development; he may be developing normally, or even supernormally, in other mental functions. Scientific pedagogy must attempt, however, to determine the lines of mental action along which the child is making no progress and those along which he is improving, so that the training may be adapted to the individual's developmental idiosyncrasies.

(4) The *boys show a higher degree of efficiency* than the girls in these tests. In studying the records of the two sexes (as well as of the various ages) space limitations make it necessary to limit the comparison to the last two columns of the table, which give the average efficiency in each test for the six sittings, and the fourth index of improvement $(\frac{5\text{–}6}{1\text{–}2})$. Ages 8 and 16 must necessarily be excluded, so that we have to compare the records of nine boys with sixteen girls in five ages (11 to 15, inclusive). In considering the two sexes the comparison must be chiefly based on the average scores for the nine boys and the sixteen girls, irrespective of the age, and only incidentally on the scores in each age, because of the fewness of the subjects in some of the ages.

From the number of ages in which the

boys excelled, and the average percentage of efficiency, as given in the following tabulation, it is at once apparent that the boys surpass the girls in all except the perception test:

Test.	No. of ages in which boys excel.	Boys, per cent.	Girls, per cent.	Difference, per cent.
Memory	4	45.9	43.4	2.5
Spon. assoc.	5	60.9	50.6	10.3
Addition	4	49.3	32.9	14.4
Antonym	3	59.2	46.0	13.2
Perception	1	43.1	47.0	−3.9
Average	3.4	51.7	43.9	

The boys excel on the average in 3.4 of the five ages, and the boys' average score in the five tests is 8.8 per cent. higher than the girls'. The boys' superiority is particularly manifest in adding, associating antonyms, and spontaneous association—the three tests which require the exercise of the higher mental functions.

(5) The boys' manifest superiority in the efficiency scores is *not paralleled* by an equal superiority in the *improvement indices.* In the following tabulation it is seen that the girls in 2.6 of the five ages made greater progress, and that their average index of improvement is 0.07 larger than the boys':

Test.	No. of ages in which boys excel.	Boys, *f.*	Girls, *f.*	Difference.
Memory	2	1.25	1.09	0.16
Spon. assoc.	1	1.32	1.53	0.21
Addition	4	1.48	1.31	0.17
Antonym	1	1.97	2.40	0.43
Perception	4	1.71	1.72	0.01
Average	2.4	1.54	1.61	0.19

The boys improved more after treatment than the girls in two tests, memory and addition, and the girls more than the boys in two tests also, spontaneous association and supplying antonyms, while the improvement was practically the same in the remaining test, perception. On the other hand, if we consider the records of those who made very poor and very good progress in *A* and *B,* we find that 13 of the 17 girls (or 76 per cent.) were included in *A* (poor progress pupils) as against 6 of the 10 boys (or 60 per cent.); while 7 of the 17 girls (or 41 per cent.) were included in *B* (rapid progress pupils) as against 6 of the 10 boys (60 per cent.). Here the boys have the advantage. On the whole, there is little progress difference between the sexes, so that we may say that girls and boys will profit in about equal degree from an appropriate orthogenic regimen.

(6) There is an apparent lack of age standards in the *strength* or *efficiency* of the traits or *capacities* measured in these tests. In the following tabulation those ages in which the efficiency scores are the smallest are given in the first line (I), and those in which the scores are the largest in the fifth line (V):

Rank.	Memory.	Spont. Assoc.	Addition.	Antonym.	Perception.
I	13	15	12	15	11
II	12	12	15	12	15
III	15	14	11	14	12
IV	11	13	14	13	13
V	14	11	13	11	14

In not more than one test, perception, do the efficiencies increase regularly with age, and even in this, age 15 is markedly out of place. In all the other tests the order is seemingly fortuitous. Thus the 11-year-olds surpass the older pupils in all except the perception test; the 12-year-olds indeed occupy their proper positions in three tests, but are too low and too high in one test each; the 13-year-olds are near the top in all except the memory test; the 14-year-olds are above and below in two tests each and right in one; and the 15-year-olds are near the bottom or too low in all the tests. The oldest pupils (age 15) thus show the least capacity in two of the tests, and are inferior in all the others, while the youngest pupils (age 11) surpass all the others in two tests and are near the top in two tests.

This random ranking at once raises the presumption that there are no distinct age standards in the power of recall of memorized three-place digits, in spontaneous association, in adding, and in associating antonyms. However, the differences between the highest and the lowest age scores are considerable in some of the tests, amounting to percentages of 8.1 in memory, 9.8 in supplying antonyms, 13.2

in perception, 13.5 in addition, and 22.7 in spontaneous association; so that, while these differences may not be large enough to justify the belief that age standards are possible for *each one* of these five ages, yet they do justify the belief that standards can be established for some of these ages. Moreover, that a negative conclusion would be over-hasty appears from the following considerations: (1) The number of pupils in each age is too small to serve as a basis for a negative conclusion; at best only a suspicion or negative presumption would be justified. It is noticeable, for example, that the low results in age 15 are largely due to the poor record of subject 4, whose scores are among the very lowest in all five tests. Similarly, subject 5, age 11, and less conspicuously, subject 6, have unusually high scores. (2) We have been testing a group of *specially selected pupils,* all suffering from a determinate physical disorder, and the majority of whom were pedagogically retarded. Possibly the retardation effect may accelerate with age.

Nevertheless, these equivocal or negative results must be regarded as of great value, because they demonstrate the paramount importance of selecting pupils known to be fairly normal physically and mentally, when tests are made for the purpose of establishing psychical age norms—a contention which I have frequently made in published memoirs.

(7) There is also a *lack of age standards* in the *indices of improvement* $(f\frac{5-6}{1-2})$; that is, in the relative amount of gain made during the experimental year. We cannot say that the younger pupils profit more from the treatment than the older, or *vice versa.* There are no significant age uniformities, as seen in the following tabulation, wherein the ages in which the gains are the smallest appear first (I), and those in which they are the largest last (V):

Rank.	Memory.	Spont. Assoc.	Addition.	Antonym.	Perception.
I	15	13	12	13	13
II	12	12	13, 14	14	14
III	14	11	11	12	12
IV	13	15	15	11	11
V	11	14	15	15	11

The largest gains are made by the 11- and 15-year-olds, and the smallest by the 13-year-olds, the 12- and 14-year-olds occupying positions between. If we score one point for rank I, two for rank II, three for rank III, four for rank IV, and five for rank V, age 11 will then score 20 points; age 15, 15 points (reduced because one score is missing in the perception test); age 14, 14 points; age 12, 12 points; and age 13, 9 points. In no age are all the gains found either in the highest or the lowest rank in all the tests. On the contrary, some ages gain much more in some tests than in others. The rank of age 15 varies from rank I in one test to V in another, and ages 12, 13, and 14 vary from rank I to rank IV, or from II to V (four ranks).

There is, however, considerable difference between the gains made in various ages, as shown by the *range* of the indices —that is, the difference between the age in which the improvement was the smallest and the age in which it was the largest. The range amounts to 0.40 in memory, 0.53 in spontaneous association, 0.51 in adding, 1.96 in supplying antonyms, and 0.36 in perception. The variation in the gains is distinctly largest in the antonym test.

From the above analysis it thus appears that pupils between the ages of 11 and 15 improve from the application of hygienic oral treatment, but we cannot say that the gain is greater for the younger than the older pupils. It might be supposed that the younger pupils would gain most largely; the earlier the physical defects are arrested the greater the benefits. This is generally believed to be the case, particularly as affects nasopharyngeal obstructions. It may be remarked, however, that the greatest gains here were made by the youngest group (11-year-olds).

(8) The evidence presented above furnishes the first demonstration, by means of serial experimental tests extending throughout a whole year, of the psycho-orthogenic effects of the application of the broad principles of community mouth hygiene. Under the "broad principles of mouth hygiene" I include the operative

TABLE I.

Immediate Reproduction of Memorized Three-place Digits: A 1 to 6.

Tests (1 to 6)			1	2		3		4		5		6		(7)	(8)					
Subj.	*Age.*	*Sex.*	%	%	f^2_1	%	f^3_2	%	f^4_3	%	f^5_4	%	f^6_5	1–2 %	3–6 %	$f\frac{3-6}{1-2}$	f^6_1	*av.* 1–6 %	f_{2-6}	$f\frac{5-6}{1-2}$
8	10	G	40	40	1.00	33.3	.83	26.5	.79	46.6	1.75	23.2	.49	40	32.4	.81	.58	34.9	.97	1.74
16	11	B	20	20	1.00	36.6	1.83	30	.81	36.6	1.22	50	1.36	20	38.3	1.91	2.50	32.2	1.24	2.16
6	11	B	43.2	29.9	.69	23.2	.77	46.6	2.00	59.9	1.28	60	1.00	36.5	47.4	1.29	1.38	43.8	1.15	1.64
5	11	B	80	53.3	.66	43.2	.81	43.2	1.00	60	1.38	73.2	1.22	66.6	54.9	.82	.91	58.8	1.01	1.00
		av.^{1}	47.7	34.4	.78	34.3	1.13	39.9	1.27	52.1	1.29	61.0	1.19	41.0	46.8	1.34	1.59	44.9	1.13	1.60
7	11	G	46.6	43.3	.92	26.6	.61	43.2	1.62	46.6	1.07	33.3	.71	44.9	37.4	.83	.71	39.9	.98	.88
20	11	G	33.2	40	1.20	43.3	1.08	43.2	.99	53.2	1.23	56.5	1.06	36.6	32.7	.89	1.70	44.9	1.11	1.49
		av.^{2}	39.9	41.6	1.06	34.9	.84	43.2	1.30	49.9	1.15	44.9	.88	40.7	35.0	.86	1.20	42.4	1.04	1.18
		av.^{3}	44.6	37.3	.93	34.6	1.02	41.2	1.28	51.2	1.23	45.6	1.07	40.9	42.1	1.15	1.44	43.9	1.09	1.43
19	12	B	40	39.9	1.00	26.6	.66	40	1.50	40	1.00	33.1	.83	39.9	34.9	.87	.82	36.6	.99	.91
24	12	G	36.6	39.9	1.09	43.2	1.08	36.6	.85	29.8	.81	43.1	1.44	38.2	38.1	1.00	1.17	38.2	1.05	.95
3	12	G	56.6	49.9	.88	46.6	.93	46.6	1.00	49.9	1.07	43.2	.86	53.2	46.6	.87	.76	48.8	.95	1.14
21	12	G	63.3	43.3	.68	50	1.15	39.8	.79	56.6	1.42	43.1	.76	53.3	47.3	.88	.68	49.3	.96	.93
17	12	G	36.6	50	1.36	33.3	.66	36.6	1.09	33.3	.91	43.3	1.30	43.3	36.6	.84	1.18	38.8	1.06	.88
12	12	G	26.6	46.6	1.75	40	.85	46.6	1.16	60	1.28	53.3	.89	36.6	49.9	1.36	2.00	45.5	1.18	1.54
		av.^{2}	43.9	45.9	1.15	42.6	.93	41.2	.98	45.9	1.09	45.2	1.05	44.9	43.7	.99	1.16	44.1	1.04	1.08
		av.^{3}	43.2	44.9	1.12	39.9	.88	41.0	1.06	44.9	1.08	43.1	1.01	44.0	42.2	.97	1.10	42.8	1.03	1.05
11	13	B	50	46.6	.93			26.5		59.8	2 25	49.9	.83	48.3	45.4	.94	1.00	46.5	1.33	1.13
15	13	G	40	33.3	.83	20	.60	40.0	2.00	29.9	.75	60	2.00	36.6	37.4	1.02	1.50	37.2	1.23	1.22
27	13	G	33.3	26.6	.79	40	1.50	23.2	.58	29.9	1.28	56.5	1.89	29.9	37.4	1.25	1.69	34.9	1.21	1.44
		av.^{2}	36.6	29.9	.81	30	1.05	31.6	1.29	29.9	1.01	58.2	1.94	33.2	37.4	1.13	1.59	36.0	1.22	1.33
		av.^{3}	41.1	35.5	.85			29.9		39.8	1.43	55.4	1.57	38.2	40.0	1.07	1.39	39.5	1.26	1.26
25	14	B	53.2	40	.75	60	1.50	46.4	.77	56.6	1.21	46.6	.82	46.6	52.4	1.12	.87	50.4	1.01	1.10
14	14	B	53.2	36.5	.68	36.6	1.00	53.3	1.45	39.9	.74	59.9	1.50	44.8	47.4	1.05	1.12	46.5	1.07	1.11
		av.^{1}	53.2	38.2	.71	48.3	1.25	49.8	1.11	48.2	.97	53.2	1.16	45.7	49.9	1.08	.99	48.4	1.04	1.10

9	14	G	60	50	.83	60	1.20	60	1.00	43.3	.72	50	1.15	55	53.3	.96	.83	53.9	.98	.84
22	14	G	39.7	33.2	.83	36.6	1.10	50	1.36	49.9	.99	59.9	1.20	36.4	49.1	1.34	1.50	44.9	1.09	1.50
10	14	G	40	56.6	1.41	43.3	.76	53.2	1.22	53.3	1.00	56.6	1.06	48.3	51.6	1.06	1.41	50.5	1.09	1.13
2	14	G	36.6	23.2	.63	46.6	2.00	39.9	.85	49.9	1.25	43.1	.86	29.9	44.9	1.50	1.17	39.9	1.11	1.55
18	14	G	40	49.9	1.24			53.2		56.6	1.06	36.5	.64	44.9	48.8	1.08	.91	47.2	.98	1.03
23	14	G	60	40	.66	43.3	1.08	40	.92	43.3	1.08	59.8	1.38	50.0	46.6	.93	.99	47.7	1.02	1.03
		av.[2]	46.0	41.2	.93	45.9	1.23	49.3	1.07	49.3	1.01	50.9	1.05	44.0	49.0	1.14	1.13	47.3	1.04	1.18
		av.[3]	47.8	41.1	.88	46.6	1.23	49.5	1.08	49.1	1.00	51.5	1.07	44.4	49.2	1.13	1.10	47.6	1.04	1.16
1	15	B	63.3	40	.63	56.6	1.41	53.2	.94	49.8	.93	59.9	1.20	51.6	54.9	1.06	.94	53.8	1.02	1.06
13	15	B	56.5	33.3	.58	43.2	1.29	33.3	.77	46.6	1.40	56.6	1.21	44.9	44.9	1.00	1.00	44.9	1.05	1.14
		av.[1]	59.9	36.6	.60	49.9	1.35	43.2	.85	48.2	1.16	58.2	1.20	48.2	49.9	1.03	.97	49.3	1.03	1.10
4	15	G	36.6	33.2	.90	33.3	1.00	29.9	.90	40	1.33	23.2	.58	34.9	31.6	.90	.63	32.7	.94	.90
		av.[3]	52.1	35.5	.70	44.3	1.23	38.8	.87	45.4	1.22	46.5	.99	43.8	43.8	.98	.85	43.8	1.00	1.03
26	16	B	66.5			36.6		49.8	1.36	53.1	1.06	66.1	1.24	66.5	51.4	.77	.99	54.4	1.22	.89
General av.			46.3	39.9	.92	40.1	1.07	41.8	1.10	47.2	1.16	49.5	1.09	43.6	44.2	1.05	1.11	44.3	1.07	1.19

SCORING: 10 per cent. for three digits correct in each number; 6.6 per cent. for two digits correct, and 3.3 per cent. for one digit correct (6.6 + 3.3 credited as 10 per cent.)

treatment of diseased dentures and gums, the habitual brushing of the teeth, the sanitation of the oral cavity, and the thorough mastication of the food. As was intimated in Part I, this evidence is not as complete as would be desirable, owing to the fact that the same series of tests were not carried out on a group of pupils, equally defective physically and mentally, who did not receive any treatment. The writer foresaw from the outset the paramount need of testing

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EXPLANATION OF TABLES.

Subj. subject. *Age* (*i.e.* as of May 1910). *Sex* (B, boy; G, girl). *Av.*[1], average for boys. *Av.*[2], average for girls. *Av.*[3], average for both sexes of a given age.

%, per cent. of efficiency, or the amount of the score in terms of percentage. The score in the column numbered 1 is the result of the test for May 31, 1910 (1st test, or test sitting, or first test day); column 2, for June 6, 1910 (2d test); in column 3, for August 31, 1910 (3d test); in column 4, for September 21, 1910; in column 5, for May 4, 1911; in column 6, for May 10, 1911. Column 7 gives the average of the 1st and 2d tests; column 8, the average of the 3d, 4th, 5th, and 6th tests; and the third column from the end, the average for all six tests. All sittings were at 3.30 P.M. except the third (10 A.M.).

f, index of improvement, showing the gain or loss from test to test. It is obtained by dividing the score of a given test (or the average of a given number of tests) into the score of the next following test (or the average of a given number of later tests). $f\frac{2}{1}$ represents the result (index) of dividing the score of test 1 into test 2; $f\frac{3}{2}$, test 2 into test 3; $f\frac{4}{3}$, test 3 into test 4; $f\frac{5}{4}$, test 4 into test 5; $f\frac{6}{5}$, test 5 into test 6; $f\frac{6}{1}$ (4th column from the end), test 1 into test 6; $f\frac{3-6}{1-2}$, the average of the first two tests into the average of the last four; and $f\frac{5-6}{1-2}$ (last column), the average of the first two into the average of the last two tests. f2-6 is the average index of improvement for all the tests (the sum of $f\frac{2}{1}$ to $f\frac{6}{5}$ divided by 5—unless indeed the subject was absent from some of the tests).

To illustrate, we may take subject 8 in Table I. Test 1 (40 per cent.) divided into test 2 (40 per cent.) = 1.00. The index is 1.00, which is unity, and therefore indicates neither loss nor gain. Test 2 (40 per cent.) divided

TABLE II.

SPONTANEOUS ASSOCIATION WITH KEYWORDS SUPPLIED: B 1 to 6.

TESTS (1 to 6)			1	2		3		4		5		6		(7)	(8)					
Subj.	*Age.*	*Sex.*	%	%	f_1^2	%	f_2^3	%	f_3^4	%	f_4^5	%	f_5^6	1–2 %	3–6 %	f_{1-2}^{3-6}	f_1^6	*av.* 1–6 %	f_{2-6}	f_{1-2}^{5-6}
8	10	G	49.5	35.2	.71	59.4	1.68	59.4	1.00	46.6	.78	23.2	.49	42.3	47.1	1.11	.46	45.5	.93	.82
16	11	B	26.4	33	1.25	33	1.00	39.6	1.20	56.1	1.41	49.5	.88	29.7	44.5	1.49	1.87	39.6	1.15	1.77
6	11	B	69.3	72.6	1.04	72.6	1.00	89.1	1.22	82.5	.92	85.8	1.04	70.9	82.5	1.16	1.23	78	1.04	1.18
5	11	B	69.3	79.2	1.14	66	.83	69.3	1.05	96	1.38	85.5	.88	74.2	79.2	1.06	1.23	77.5	1.05	1.22
		av.[1]	55.0	61.6	1.14	57.2	1.41	66.0	1.15	78.2	1.23	73.6	.93	58.2	68.7	1.23	1.44	65.0	1.08	1.39
7	11	G	42.2	69.3	1.64	52.8	.76	56.1	1.06	56.1	1.00	72.6	1.29	55.7	59.4	1.06	1.72	58.1	1.15	1.55
20	11	G	46.2	52.8	1.14	49.5	.93	56.1	1.13	75.9	1.35	75.9	1.00	49.5	64.3	1.30	1.64	59.4	1.11	1.53
		av.[2]	44.2	61.0	1.39	51.1	.84	56.1	1.09	66.0	1.17	74.2	1.14	52.6	61.8	1.18	1.68	58.7	1.12	1.54
		av.[3]	50.6	61.3	1.24	54.7	.90	62.0	1.13	73.3	1.21	73.8	1.01	56.0	65.9	1.21	1.54	63.5	1.10	1.45
19	12	B	46.2	66	1.42	49.5	.75	56.1	1.13	79.2	1.41	82.5	1.04	56.1	66.8	1.19	1.78	63.2	1.15	1.44
24	12	G	49.5	36.3	.73	56.1	1.54	56.1	1.00	62.7	1.11	52.8	.84	42.9	56.9	1.32	1.06	52.2	1.04	1.34
3	12	G	39.6	52.8	1.33	49.5	.93	52.8	1.06	66	1.25	62.7	.95	46.2	57.7	1.24	1.58	53.9	1.10	1.39
21	12	G	19.8	49.5	2.50	42.9	.86	49.5	1.15	46.2	.93	49.5	1.07	34.6	47.0	1.35	2.50	42.9	1.31	1.38
17	12	G	52.8	49.5	.93	46.2	.93	59.4	1.28	59.4	1.00	49.5	.83	51.1	53.6	1.04	.93	44.2	.99	1.06
12	12	G	33	52.8	1.60	56.1	1.06	49.5	.88	79.2	1.60	82.5	1.04	42.9	66.8	1.55	2.50	58.8	1.23	1.88
		av.[2]	38.9	48.1	1.41	50.1	1.06	53.4	1.07	62.7	1.16	59.4	.94	43.5	56.4	1.30	1.71	50.4	1.13	1.41
		av.[3]	40.1	51.1	1.42	50.0	1.01	53.9	1.08	65.4	1.21	63.2	.96	45.6	58.1	1.28	1.72	52.5	1.13	1.41
11	13	B	69.3	75.9	1.09			49.5		82.5	1.66	66	.80	72.6	66.0	.90	.95	68.6	1.18	1.02
15	13	G	36.3	42.9	1.18	33	.76	29.7	.90	46.2	1.55	49.5	1.07	39.6	39.6	1.00	1.36	39.6	1.09	1.20
27	13	G	69.3	82.5	1.19	56.1	.68	69.3	1.23	79.2	1.14	82.5	1.04	75.9	71.8	.94	1.19	73.1	1.05	1.06
		av.[2]	52.8	62.7	1.18	44.5	.72	49.5	1.06	62.7	1.34	66.5	1.05	57.7	55.7	.97	1.27	56.3	1.07	1.13
		av.[3]	53.8	67.1	1.15			49.5		69.3	1.45	66.3	.97	62.7	59.1	.94	1.16	60.4	1.10	1.09
25	14	B	46.2	66	1.42	66	1.00	59.4	.90	75.9	1.27	62.7	1.08	56.1	66.0	1.17	1.35	62.7	1.13	1.23
14	14	B	26.4	56.1	2.12	39.6	.70	49.5	1.25	79.2	1.60	79.2	1.00	41.2	61.8	1.47	3.00	55.0	1.33	1.92
		av.[1]	36.3	61.0	1.77	52.8	.85	54.4	1.07	77.5	1.43	70.9	1.04	48.6	63.9	1.32	2.17	58.8	1.23	1.57

9	14	G	39.6	46.2	1.16			33		29.7	.90	19.8	.66	42.9	27.5	.64	.50	33.6	.90	.57
22	14	G	24.4	29.7	1.21	36.3	1.22	49.5	1.36	66	1.33	75.9	1.15	27.0	56.9	2.10	3.11	46.9	1.25	2.62
10	14	G	39.6	56.1	1.41	36.3	.64	59.4	1.63	62.7	1.05	66	1.05	47.8	56.1	1.17	1.66	53.3	1.15	1.34
2	14	G	26.4	36.3	1.37	42.9	1.18	46.2	1.07	66	1.42	92.4	1.40	31.3	61.8	1.97	3.50	51.7	1.29	2.53
18	14	G	13.2	42.9	3.25			59.4		42.9	.72	46.2	1.07	28.0	49.5	1.76	3.50	40.9	1.68	1.58
23	14	G	79.2	75.9	.95	89.1	1.17	85.5	.95	95.7	1.11	85.8	.89	77.5	59.3	.76	1.08	85.2	1.01	1.17
		av.[2]	37.0	47.8	1.56	51.1	1.05	55.5	1.25	60.5	1.09	64.3	1.03	42.4	51.8	1.40	2.22	51.9	1.21	1.63
		av.[3]	36.8	51.1	1.61	51.7	.98	55.2	1.19	64.7	1.17	66.0	1.03	43.9	54.8	1.38	2.21	53.6	1.21	1.62
1	15	B	59.4	56.1	.94	52.8	.94	62.7	1.18	66	1.05	62.7	.95	57.7	61.0	1.05	1.05	59.9	1.01	1.11
13	15	B	42.9	49.5	1.15	36.3	.73	41.8	1.15	46	1.10	49.5	1.07	46.2	43.4	.93	1.15	44.3	1.04	1.03
		av.[1]	51.1	52.8	1.04	44.5	.83	52.2	1.16	56	1.07	56.1	1.01	51.9	52.2	.99	1.10	52.1	1.02	1.07
4	15	G	3.3	13.2	4.00	16.5	1.24	19.8	1.19	22.1	1.11	16.5	.74	8.2	18.7	2.28	5.00	15.2	1.65	2.35
		av.[3]	35.2	32.8	2.03	35.2	.97	41.4	1.17	44.7	1.08	42.9	.92	37.3	41.0	1.42	2.40	39.8	1.23	1.49
26	16	B	46.2			29.7	.64	42.9	1.44	59.4	1.38	56.1	.94	46.2	47.0	1.01	1.21	46.8	1.10	1.24
General av.			43.1	52.9	1.45	48.6	.96	53.7	1.14	63.9	1.20	62.3	.97	47.9	56.0	1.49	1.78	52.7	1.15	1.42

SCORING: 3.3 per cent. for each "associate" written. (Each sheet contained thirty words.)

such a parallel group, and deeply deplores the fact that such a class could not be organized.

There is probably no phase of the modern "child welfare" movement which merits deeper scientific study at the hands of qualified experts, than the causal relation of normative physical health and growth, and of normative pedagogical and psychical progress and development of children of school age, to a well-conceived scheme of physical and mental orthogenics. There is no problem in the sphere of national conservation or racial

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into 3 (33.3 per cent.) =0.83 (a loss of 17 per cent.; 1.00—0.83=0.17). Test 3 (33.3 per cent.) divided into 4 (26.5 per cent.) =0.79 (a loss of 21 per cent.); etc. Accordingly, in f_1^2 the relative size of the score in test 2 is determined in relation to the size of the score in test 1, which is regarded as unity, whence the index indicates the relative amount by which test 2 is larger or smaller than 1, regarded as unity; and similarly for the other indices. To convert the index (f) into per cent. of loss or gain, subtract the index from 1.00 when it is smaller than unity (= per cent. of loss); and subtract 1.00 from the index when the latter is larger than unity (= per cent. of *gain*). The division is carried only to two decimal places, but the inaccuracies which thereby arise are very slight.

Each score in each of the five tests for each subject on a given test day represents the result of one test.

The *general average* at the bottom of each column in the tables, both for the percentage of efficiency and for the index of improvement, is obtained by adding all the individual scores and dividing by the actual number of scores in the given column. The number of individual scores (or subjects) is twenty-seven. But a few subjects were absent on certain test days, and a few of the individual scores have been excluded from the averages, because they appeared to be fortuitous, irregular, or abnormal. Hence the divisor is not always 27 in the different columns. It is thus apparent that the average indices at the bottom of the columns were obtained from the average per cents. of improvement, by dividing the general average of 1 into 2, 2 into 3, etc., and that, for the reason given above, the index obtained by the latter method need not, and often will not, correspond to the index obtained by the method employed in the tables.

TABLE III.

Addition of One-place Digits: C 1 to 6.

Tests (1 to 6)			1	2		3		4		5		6		(7)	(8)					
Subj.	*Age.*	*Sex.*	%	%	f^{2}_{1}	%	f^{3}_{2}	%	f^{4}_{3}	%	f^{5}_{4}	%	f^{6}_{5}	1-2 %	3-6 %	f^{3-6}_{1-2}	f^{6}_{1}	*av.* 1-6 %	f 2-6	$f^{5\cdot 6}_{1-2}$
8	10	G	24	22	.91	14	.63	24	1.71	24	1.00	26	1.08	23	22	.95	1.08	22.3	1.06	1.08
16	11	B	28	32	1.14	28	.87	30	1.07	50	1.66	50	1.00	30	39.5	1.31	1.78	36.3	1.14	1.66
6	11	B	38	32	.84	36	1.12	48	1.33	52	1.08	58	1.11	35	48.5	1.38	1.52	44.0	1.09	1.57
5	11	B	50	42	.84	48	1.14	48	1.00	60	1.25	66	1.10	46	55.5	1.20	1.32	52.3	1.06	1.36
		av.[1]	38.6	35.3	.94	37.3	1.04	42	1.13	54	1.33	58	1.07	37	47.8	1.29	1.54	44.2	1.09	1.53
7	11	G	34	34	1.00	30	.88	36	1.20	32	.88	42	1.31	34	35	1.02	1.23	34.6	1.05	1.08
20	11	G	28	32	1.14	32	1.00	32	1.00	40	1.25	42	1.05	30	36.5	1.21	1.50	34.3	1.08	1.36
		av.[2]	31	33	1.07	31	.94	34	1.10	36	1.06	42	1.18	32	35.7	1.11	1.36	34.4	1.06	1.22
		av.[3]	35.8	34.4	.99	34.8	1.00	38.8	1.12	46.8	1.22	51.6	1.11	35	43.0	1.22	1.47	40.3	1.08	1.40
19	12	B	14	20	1.42	16	.80	24	1.50	26	1.08	32	1.23	17	24.5	1.44	2.28	22	1.20	1.70
24	12	G	18	14	.77	18	1.28	16	.88	16	1.00	18	1.12	16	17	1.06	1.00	16.6	1.01	1.06
3	12	G	28	28	1.00	26	.92	32	1.23	34	1.06	36	1.05	28	32	1.14	1.28	30.6	1.05	1.25
21	12	G	38	36	.94	30	.83	36	1.20	46	1.27	42	.91	37	38.5	1.04	1.10	38.0	1.03	1.18
17	12	G	22	28	1.25	22	.78	24	1.09	22	.91	32	1.45	25	25	1.00	1.45	25.0	1.09	1.08
12	12	G	56	40	.71	46	1.15	50	1.08	46	.92	56	1.21	48	49.5	1.03	1.00	49.0	1.01	1.06
		av.[2]	32.4	29.2	.93	28.4	.99	31.6	1.29	32.8	1.03	36.8	1.15	30.8	32.4	1.05	1.16	31.8	1.04	1.12
		av.[3]	29.3	29.3	1.01	26.3	.96	30.3	1.33	31.6	1.04	36.0	1.16	28.5	31.0	1.11	1.35	30.2	1.06	1.22
11	13	B	42	60	1.42			62		68	1.09	70	1.02	51	66.6	1.30	1.66	60.4	1.17	1.35
15	13	G	28	42	1.50	28	.66	40	1.42	50	1.25	60	1.20	35	44.5	1.27	2.14	41.3	1.20	1.57
27	13	G	26	32	1.23	24	.75	32	1.33	26	.81	38	1.46	29	30.0	1.03	1.46	29.6	1.11	1.10
		av.[2]	27	37	1.36	26	.70	36	1.37	38	1.03	49	1.33	32	37.2	1.15	1.80	35.4	1.15	1.33
		av.[3]	32	44.6	1.34			44.6		46.6	1.05	56	1.22	38.3	47.0	1.20	1.75	43.7	1.36	1.34
25	14	B	42	48	1.14	48	1.00	50	1.04	54	1.08	64	1.18	45	54	1.20	1.52	51.0	1.09	1.31
14	14	B	68	56	.82	72	1.28	78	1.08	86	1.10	96	1.11	62	83	1.34	1.41	76.0	1.07	1.46
		av.[1]	55	52	.98	60	1.14	64	1.06	70	1.09	80	1.14	53.5	68.5	1.27	1.46	63.5	1.08	1.38

9	14	G	40	40	1.00	44	1.10	52	1.18	50	.96	56	1.12	40	50.5	1.26	1.40	47.0	1.07	1.32
22	14	G	18	20	1.11	32	1.60	22	.68	36	1.63	42	1.16	19	33.0	1.73	2.33	28.3	1.23	2.05
10	14	G	38	36	.94	32	.88	36	1.12	46	1.27	46	1.00	37	40.0	1.08	1.21	39.0	1.04	1.24
2	14	G	34	40	1.17	36	.90	42	1.16	52	1.23	46	.88	37	44.0	1.18	1.35	41.6	1.07	1.32
18	14	G	32	32	1.00			30		20	.66	36	1.80	32	28.6	.89	1.12	30.0	1.15	.87
23	14	G	30	20	.66	24	1.20	12	.50	30	2.50	28	.93	25	23.5	.94	.93	24.0	1.15	1.16
		av.[2]	32	31.3	.98	33.6	1.13	32.3	.93	39	1.37	42.3	1.16	31.6	36.6	1.18	1.39	34.9	1.11	1.32
		av.[3]	37.7	36.5	.98	41.1	1.13	40.2	.96	46.7	1.30	51.7	1.24	37.1	29.1	1.20	1.40	42.1	1.10	1.34
1	15	B	24	14	.58	20	1.42	18	.90	28	1.55	38	1.35	19	26	1.36	1.58	23.6	1.16	1.73
13	15	B	96	56	.58	66	1.17	66	1.00	92	1.39	94	1.02	76	79.5	1.04	.97	78.3	1.03	1.22
		av.[1]	60	35	.58	43	1.29	42	.95	60	1.47	66	1.18	47.5	52.7	1.20	1.27	50.9	1.09	1.47
4	15	G	12	12	1.00	14	1.16	16	1.14	28	1.75	26	.92	12	21	1.75	2.15	18.0	1.19	2.25
		av.[3]	44	27.3	.72	33	1.25	33.3	1.01	49.3	1.55	52.6	1.09	35.6	42.1	1.38	1.56	39.9	1.12	1.73
26	16	B	18			22		16	.71	24	1.50	20	.83	18	20.5	1.13	1.11	20.0	1.01	1.22
General av.			34.3	33.3	1.00	32.2	1.02	36.0	1.10	42.1	1.22	46.6	1.13	33.5	39.5	1.16	1.44	37.6	1.09	1.35

SCORING: 4 per cent. for each column correctly added; 2 per cent. for each incorrectly added—except where some were written at random without any effort to add. (Each sheet contained thirty-two columns.)

euthenics which more deeply affects the fundamentals of human existence. Our greatest national asset is the normal, healthy child—the child originally sound in body and mind by virtue of a rich hereditary dower, or the child rendered sound by the removal of physical and mental defects through the application of the principles of human orthogenics.

Surely, instead of dissipating vast resources in the attempt to cover up, gloss over, or treat *effects,* our child-welfare workers, eugenic enthusiasts, and social betterment philanthropists could more profitably apply themselves to the scientific determination of the fundamental physiological, psychological, and social *causes* of bodily and mental inefficiency, and the working up of scientific corrective measures on a community basis. Instead of devoting their resources to the gathering of statistics, and the writing of chapters on what certain cities and states are doing to better the welfare of the child, it would seem that our large research foundations could use their funds more economically, and make a larger contribution toward the permanent betterment of the race, by undertaking on an adequate scale genuine scientific investigations of the actual, demonstrated effects of the broad application of orthogenic measures of a physical and mental character. No such investigations are anywhere being prosecuted on an effective basis—this notwithstanding that no one knows the actual, proved effects on the child of the application of various pedagogical devices and methods, or of psychological or physical orthogenic measures. The average schoolmaster or doctor will not hesitate to explain it all *ex cathedra,* but the fact is that our knowledge in this field is largely pretense, sham, illusion. In no field of modern enterprise has there been such paltry attempt made to scientifically *measure results and effects* as in education—the glorified and time-honored "examination" notwithstanding. Sufficient evidence for the truth of this statement is the very obvious fact that we do not at the present time even possess any valid, scientific measures of educational results. Indeed

TABLE IV.

ANTONYM TEST: D 1 to 6.

TESTS (1 to 6)			1	2		3		4		5		6		(7)	(8)					
Subj.	*Age.*	*Sex.*	%	%	f^2_1	%	f^3_2	%	f^4_3	%	f^5_4	%	f^6_5	1-2 %	3-6 %	f^{3-6}_{1-2}	f^6_1	*av.* 1-6 %	f 2-6	f^{5-6}_{1-2}
8	10	G	10	20	2.00	28	1.40	48	1.71	54	1.12	44	.81	15	43.5	2.90	4.40	34	1.40	3.26
16	11	B	2	8	4.00	40	5.00	48	1.20	14	.29	38	2.71	5	35	7.00	19.00	25	2.64	5.60
6	11	B	44	56	1.27	72	1.28	80	1.11	86	1.07	80	.93	50	79.5	1.59	1.81	69.6	1.13	1.66
5	11	B	52	66	1.26	64	.96	78	1.21	94	1.20	90	.95	59	81.5	1.38	1.73	74	1.11	1.55
		av.^{1}	32.6	43.3	2.17	58.6	2.41	68.6	1.17	64.6	.85	69.3	1.53	38	65.3	3.32	7.51	56.2	1.62	2.93
7	11	G	20	50	2.50	44	.88	60	1.36	78	1.30	62	.79	35	61.0	1.74	3.10	52.3	1.36	2.00
20	11	G	42	56	1.33	58	1.03	60	1.03	70	1.16	78	1.11	49	66.5	1.35	1.85	60.6	1.13	1.51
		av.^{2}	31	53	1.91	51	.95	60	1.19	74	1.23	70	.95	42	63.7	1.54	2.47	56.4	1.24	1.75
		av.^{3}	32	47.2	2.07	55.6	1.83	65.2	1.18	68.4	1.00	69.6	1.29	39.6	64.7	2.61	5.49	56.3	1.47	2.46
19	12	B	20	72	3.60	66	.91	72	1.09	80	1.11	88	1.10	46	76.5	1.66	4.40	66.3	1.56	1.82
24	12	G	0	0	.00	22		36	1.63	42	1.16	48	1.14	(0)	(37)			24.6	.98	
3	12	G	12	30	2.50	34	1.13	48	1.41	44	.91	64	1.45	21	47.5	2.26	5.33	38.6	1.48	2.57
21	12	G	34	56	1.64	58	1.03	62	1.06	88	1.41	74	.84	45	70.5	1.56	2.17	62.0	1.19	1.80
17	12	G	24	28	1.16	50	1.78	46	.92	68	1.47	64	.94	26	57.0	2.19	2.66	46.6	1.25	2.46
12	12	G	12	36	3.00	54	1.50	54	1.00	62	1.14	60	.96	24	57.5	2.39	5.00	46.3	1.52	2.54
		av.^{2}	16.4	30.0	1.66	43.6	1.36	49.2	1.20	60.0	1.21	62	1.06	29	58.1	2.10	3.79	43.6	1.28	2.34
		av.^{3}	17.0	37	1.98	47.3	1.27	53	1.18	64.0	1.20	66.3	1.07	32.4	61.8	2.01	3.91	47.4	1.33	2.23
11	13	B	20	56	2.80			48		64	1.33	50	.78	38	54	1.42	2.50	47.6	1.63	1.50
15	13	G	28	46	1.64	50	1.08	52	1.04	68	1.30	54	.79	37	56	1.51	1.92	49.6	1.17	1.64
27	13	G	56	62	1.10	70	1.12	66	.94	84	1.27	80	.95	59	75	1.27	1.42	69.6	1.07	1.38
		av.^{2}	42.0	54	1.37	60	1.10	59	.99	76	1.28	67.0	.87	48	65.5	1.39	1.67	59.6	1.12	1.51
		av.^{3}	34.6	54.6	1.84			55.3		72	1.30	61.3	.84	44.6	61.6	1.40	1.94	55.6	1.29	1.50
25	14	B	54	56	1.03	66	1.17	62	.94	84	1.35	84	1.00	55	74	1.34	1.55	67.6	1.09	1.52
14	14	B	40	66	1.65	54	.81	72	1.33	74	1.02	68	.91	53	67	1.26	1.70	62.3	1.14	1.33
		av.^{1}	47	61	1.34	60	.99	67	1.13	79	1.18	76	.95	54	70.5	1.30	1.62	64.9	1.11	1.42

9	14	G	24	24	1.00	50	2.08	48	.96	50	1.04	58	1.16	24	51.5	2.14	2.41	42.3	1.24	2.25
22	14	G	12	12	1.00	32	2.66	28	.87	16	.57	34	2.12	12	27.5	2.29	2.83	22.3	1.44	2.08
10	14	G	44	58	1.31	60	1.03	66	1.10	70	1.06	84	1.20	51	70	1.37	1.90	63.6	1.14	1.50
2	14	G	36	50	1.38	60	1.20	68	1.13	56	.82	62	1.10	43	61.5	1.43	1.72	55.3	1.12	1.37
18	14	G	30	40	1.33			64		56	.87	72	1.28	35	64.0	1.82	2.40	52.4	1.16	1.82
23	14	G	0	24		42	1.75	36	.85	42	1.16	42	1.00	12	40.5	3.37		31.0	1.19	3.50
		av.[2]	24.3	34.6	1.20	48.8	1.74	51.6	.98	48.3	.92	58.6	1.31	29.5	52.5	2.07	2.25	44.4	1.21	2.08
		av.[3]	30.0	41.2	1.24	52.0	1.53	55.5	1.02	56.0	.98	63.0	1.22	35.6	41.1	1.87	2.07	49.6	1.19	1.92
1	15	B	32	76	2.37	46	.60	68	1.47	70	1.02	76	1.08	54	65	1.20	2.37	61.3	1.30	1.35
13	15	B	44	52	1.18	60	1.15	64	1.06	68	1.06	66	.97	48	64.5	1.34	1.50	59.0	1.08	1.39
		av.[1]	38	64	1.77	53	.87	66	1.26	69	1.04	71	1.02	51	64.7	1.27	1.93	60.1	1.19	1.37
4	15	G	0	6		28	4.66	26	.92	24	.92	22	.91	3	27.5	9.16		19.3	1.85	7.66
		av.[3]	25.3	44.6		44.6	2.13	52.6	1.15	54	1.00	54.6	.98	35	52.3	3.90		46.5	1.41	3.46
26	16	B	28			48		70	1.45	82	1.17	60	.73	28	65	2.32	2.14	57.6	1.11	2.53
General av.			26.6	42.5	1.75	50.2	1.57	55.9	1.15	62.5	1.08	63	1.07	35.6	59.2	2.28	3.24	50.4	1.31	2.29

SCORING: 4 per cent. for correct and 2 per cent. for partly correct antonym. (Twenty-five words on each sheeet.) Some indices for *Subj.* 4, 23, and 24 not entered, owing to abnormal gains.

the very conception of "measuring effects or results in education" is a by-product of very recent industrial thinking.

To continue this investigation of the effects of mouth hygiene upon the working efficiency of the child along broader lines (psychological, dento-medical, anthropometric, pedagogical, and social studies of squads of treated and untreated children), is an obligation which should be assumed from purely disinterested, scientific motives by one of our large research foundations. A million dollars spent in orthogenic and euthenic investigations will accomplish infinitely more for the welfare of the human race than tens of millions spent in cataloging the stars, mapping the heavens, or exploring the polar regions.

(9) Finally, the conclusion is strongly suggested that the desirability of establishing dental clinics in the public schools, for free inspection and treatment, should present itself to the taxpayer as a plain business proposition—an economic means to an economic end, the paying of proper dividends on the capital invested in the schools. The lion's share of this capital consists in the lives of the children, and the stock dividend consists in the skilful, efficient, scientific training of these children.

As has been seen, we started out with a class of retardates and repeaters. During the experimental year only one of the 27 pupils failed of promotion. According to the best estimates there are 6,000,000 retardates (pupils over-age for their grade) in the public schools of the United States. This is about one-third of the entire school population. Furthermore, about one-sixth of all the pupils are repeaters (pupils who must spend more than one year in one grade). It costs the country annually $27,000,000 to educate every sixth child over again; *i.e.* a second, third, or fourth time in the same grade (Ayres). This money which we are spending on our repeaters is partly, if not largely, waste. Is it worth while to attempt to save this waste? Worth while to the child, whose sojourn in the school is prolonged one or more

TABLE V.

ATTENTION, SPEED, AND ACCURACY OF PERCEPTUAL DISCRIMINATION AND REACTION. "A" CANCELLATION TEST: E 1 to 6.

TESTS (1 to 6)			1	2		3		4		5		6		(7)	(8)					
Subj.	*Age.*	*Sex.*	%	%	$f\frac{2}{1}$	%	$f\frac{3}{2}$	%	$f\frac{4}{3}$	%	$f\frac{5}{4}$	%	$f\frac{6}{5}$	1-2 %	3-6 %	$f\frac{3\text{-}6}{1\text{-}2}$	$f\frac{6}{1}$	*av.* 1-6 %	f 2-6	$f\frac{5\text{-}6}{1\text{-}2}$
8	10	G	27.5	33.5	1.21	36	1.07	33.5	.93	48	1.43	52.5	1.09	30.5	42.5	1.39	1.90	38.5	1.14	1.64
16	11	B	23	31	1.34	33.5	1.08	40	1.19	52	1.30	57	1.09	27	45.6	1.68	2.47	39.4	1.36	2.01
6	11	B	24.5	23.5	.95	34	1.44	33.5	.98	41	1.22	53.5	1.30	24	40.5	1.68	2.18	35.0	1.17	1.96
5	11	B	43	40	.93	32.5	.81	36	1.10	57	1.58	64	1.12	41.5	47.4	1.14	1.49	45.4	1.10	1.45
		av.[1]	30.1	31.5	1.07	33.3	1.11	36.5	1.09	50	1.36	58.1	1.17	30.8	44.5	1.50	2.04	39.9	1.21	1.80
7	11	G	29	23.5	.81	28	1.19	36	1.28	42.5	1.18	52	1.22	26.2	39.6	1.51	1.79	35.1	1.13	1.80
20	11	G	41	43.5	1.06	34.5	.79	39.5	1.14	52	1.31	61.5	1.18	42.2	46.8	1.10	1.50	45.3	1.09	1.34
		av.[2]	35.0	33.5	.93	31.2	.99	37.7	1.21	47.2	1.24	56.7	1.20	34.2	43.2	1.30	1.64	40.2	1.11	1.57
		av.[3]	32.1	32.3	1.01	32.5	1.06	37.0	1.14	21.9	1.32	57.6	1.18	32.1	43.9	1.42	1.88	40.0	2.05	1.71
19	12	B	19.5	23	1.11	26	1.13	29	1.11	38	1.31	42.5	1.11	21.2	33.8	1.59	2.17	29.6	1.16	1.89
24	12	G	38	34	.89	34.5	1.01	45	1.30	57	1.26	57.5	1.00	36	48.5	1.34	1.51	44.3	1.09	1.58
3	12	G	34	49.5	1.45	44.5	.89	44	.99	66.5	1.51	67	1.00	41.7	55.5	1.33	1.91	50.9	1.16	1.59
21	12	G	33	41.5	1.25	45.5	1.09	50.5	1.10	67.5	1.33	70	1.03	37.2	58.3	1.56	2.12	51.3	1.16	1.84
17	12	G	28.5	31	1.08	27.5	.88	40.5	1.47	48	1.18	49.5	1.03	29.7	41.3	1.39	1.73	37.5	1.12	1.63
12	12	G	36.5	30	.82	33.5	1.11	30.5	.91	47.5	1.55	52	1.09	33.2	40.8	1.22	1.42	38.3	1.09	1.49
		av.[2]	34.0	37.2	1.08	37.1	.99	42.1	1.15	57.3	1.36	59.2	1.03	35.5	48.8	1.37	1.74	44.4	1.12	1.62
		av.[3]	31.5	34.8	1.09	35.2	1.02	39.9	1.14	54.0	1.35	56.4	1.04	33.1	46.3	1.40	1.81	41.9	1.13	1.67
11	13	B	36.5	44	1.20			45.5		49.5	1.08	64	1.29	40.2	53.0	1.31	1.75	48.1	1.19	1.41
15	13	G	52.5	50	.95	33.5	.67	42.5	1.26	63	1.48	59.5	.94	51.2	49.6	.96	1.13	50.1	1.06	1.19
27	13	G	43	52	1.20	43	.82	48.5	1.12	67.0	1.38	71.5	1.06	47.5	57.5	1.21	1.66	54.1	1.11	1.45
		av.[2]	47.7	51.0	1.07	38.2	.74	45.5	1.19	63.5	1.43	56.6	1.05	49.3	53.5	1.08	1.39	52.1	1.08	1.32
		av.[3]	44.0	48.6	1.11			45.5		58.8	1.31	65.0	1.13	46.3	53.3	1.16	1.51	50.7	1.12	1.35
25	14	B	30.5	36.5	1.19	40	1.09	44	1.10	62.5	1.42	71.5	1.14	33.5	54.5	1.62	2.34	47.5	1.18	2.00
14	14	B	37	32	.86	37	1.15	49.5	1.33	66.5	1.34	55.5	.84	34.5	52.1	1.51	1.50	46.2	1.10	1.76
		av.[1]	33.7	34.2	1.02	38.5	1.12	46.7	1.21	64.5	1.38	63.5	.99	34.0	53.3	1.56	1.92	46.8	1.14	1.88

9	14	G	41	44	1.07	35.5	.80	44	1.23	56.5	1.28	59	1.04	42.5	48.7	1.14	1.43	46.6	1.08	1.35
22	14	G	33.5	38.5	1.14	43	1.11	54	1.25	62.5	1.15	74.5	1.19	36	58.5	1.62	2.22	76.5	1.16	1.90
10	14	G	46	41	.89	38	.92	38.5	1.01	67	1.74	71.5	1.06	43.5	53.7	1.23	1.55	50.3	1.12	1.59
2	14	G	42.5	37	.87	35	.94	44.5	1.27	53.5	1.20	51.0	.95	39.7	46	1.15	1.20	43.9	1.04	1.31
18	14	G	36	38	1.05			35.5		48	1.35	63.9	1.33	37	49.1	1.32	1.79	44.3	1.24	1.51
23	14	G	54	53	.98	50	.94	55	1.10	67	1.21	70	1.04	53.5	60.5	1.13	1.29	58.1	1.05	1.28
		av.^{2}	42.1	41.9	1.00	40.3	.94	45.2	1.17	59.0	1.32	64.9	1.10	42.0	52.7	1.26	1.58	53.2	1.11	1.49
		av.^{8}	40.0	40.0	1.00	39.7	.99	45.6	1.18	60.4	1.33	64.6	1.07	40.0	52.8	1.34	1.66	51.6	1.12	1.58
1	15	B	42	38.5	.91	34	.88	32	.94	55	1.11	63	1.14	40.2	46	1.14	1.50	46.0	1.11	1.44
13	15	B	38.5	45.5	1.18	46	1.01	49.5	1.07	60	1.21	67	1.11	42.0	55.6	1.32	1.74	51.0	1.11	1.51
		av.^{1}	40.2	42.0	1.04	40	.94	40.7	1.00	57.5	1.46	65	1.12	41.1	50.8	1.23	1.62	48.5	1.11	1.47
4	15	G	6	11.5		25		30	1.20	39	1.30	45.5	1.16	8.7	34.8			26.1	1.22	
		av.^{8}	24.8	24.1		35		37.1	1.07	51.3	1.41	58.0	1.13	24.5	45.4			41.0	1.14	
26	16	B	38			37		46	1.24	63	1.36	66	1.04	38	53	1.40	1.73	50	1.21	1.69
General av.			34.9	36.2	1.06	36.2	.99	41.3	1.14	54.7	1.34	60.4	1.09	35.6	48.6	1.34	1.73	45.5	1.14	1.60

SCORING: ½ per cent. (0.5) for each A crossed; 0.5 per cent. deducted for each A missed or wrong letter crossed. Letters considered only up to the last A crossed. (Some indices omitted for *Subj.* 4—first two records abnormal.)

years by repetition, and whose efficiency for life work is lessened by removable obstacles? Worth while to the taxpayer, who must bear an extra financial outlay for work that should have been satisfactorily done the first time?

We started out with a class containing a number of pupils who were very irregular in attendance, owing to toothaches and indispositions. Five carried truancy cards. During the experimental year the regularity of attendance was greatly improved, owing to the improved health and buoyancy of the children. Not a single truancy card was made out for these twenty-seven pupils. To increase a child's regularity is to increase his chances of promotion. In fact, one of the chief causes of non-promotion and pedagogical retardation is irregularity of attendance. Certainly many pupils would not fail if they attended school more regularly. Any measure which will increase attendance will accordingly decrease repetition.

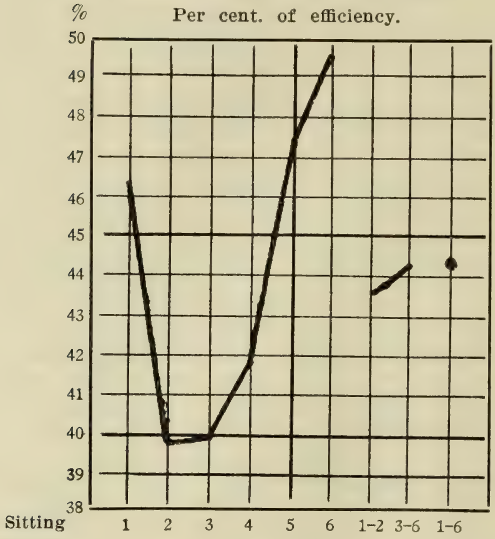
On the psychological side, the class showed an improvement during the year which amounted on the average to about 50 per cent. That a large part of this increased efficiency was *directly due to the mouth orthogenics* is attested by the parallel pedagogical improvement made by the pupils during the year. But even if we allow that only one-half of the improvement was due directly to the treatment, the gain would still be very great. In fact, an efficiency improvement of 10 per cent., demonstrably due directly to a given line of orthogenic treatment, would amount to one school year in ten, would save many children from failure in their grades, would enable others, whose work would otherwise be mediocre, to attain a high degree of proficiency, and in the aggregate would save millions of dollars annually to the taxpayer, and a comparatively small additional outlay.

The proposition, however, to place children in a position to work as nature intended they should work, unhampered by remediable physical disorders and mental handicaps, does not rest its claims on purely financial grounds—it is first and foremost a humanitarian proposition.

GRAPH I*a*.

Memorizing Three-place Digits.

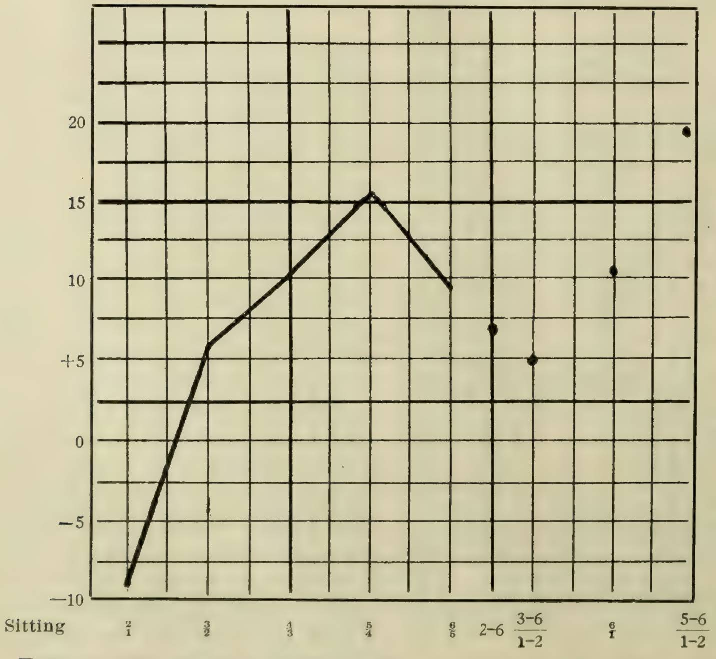
Per cent. of efficiency.



GRAPH I*b*.

Memorizing Three-place Digits.

Per cent. of improvement (loss or gain).



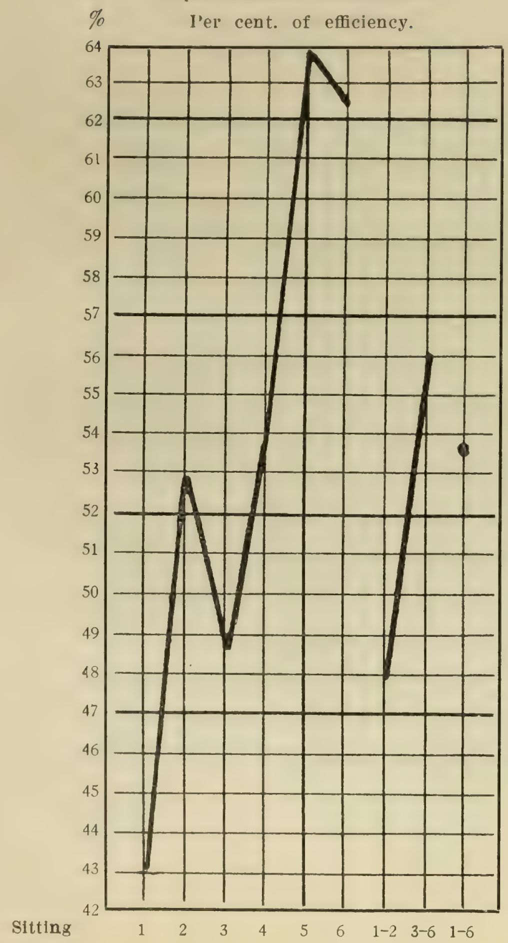
EXPLANATION OF THE GRAPHS. The numbers at the bottom in both series (*a* and *b*) have the same meaning as in the tables.

The "efficiency" scores and "improvement" indices are plotted in per cents. along the vertical axes. The results for successive sittings or combination of sittings appear along the horizontal axes. In the "improvement" graphs (*b*) the indices have been translated into per cents. of gain or loss. I*b* shows the improvement for I*a*; II*b* for II*a*, etc.

Graph IIa.

Spontaneous Association.

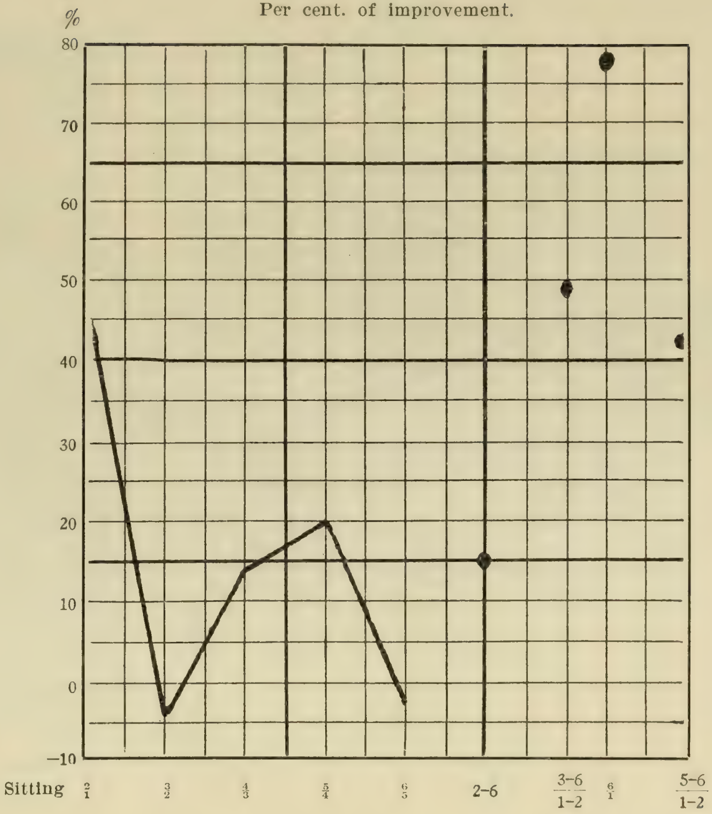
Per cent. of efficiency.



Graph IIb.

Spontaneous Association.

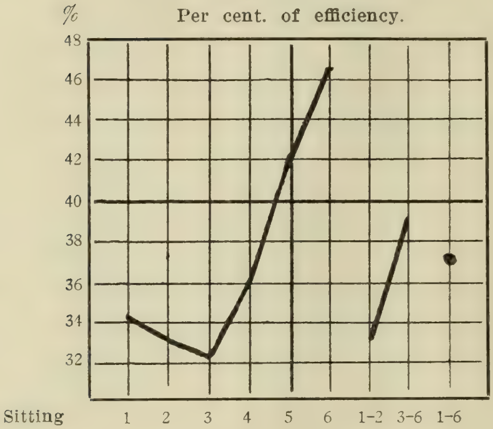
Per cent. of improvement.



GRAPH IIIa.

Addition of One-place Digits.

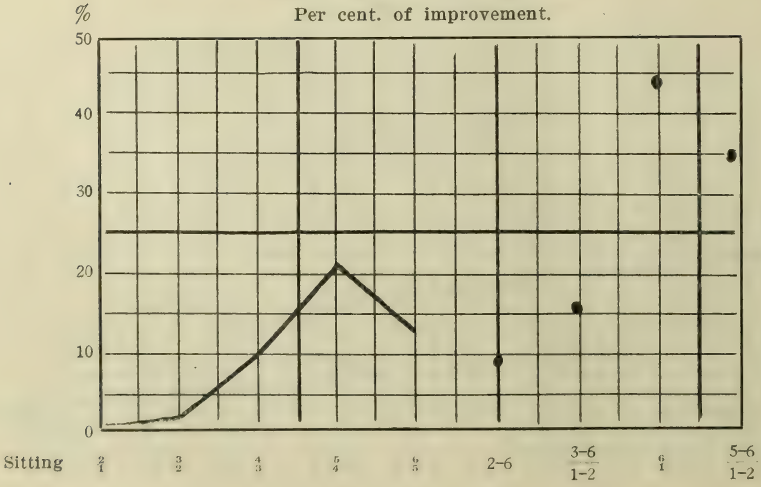
Per cent. of efficiency.



GRAPH IIIb.

Addition of One-place Digits.

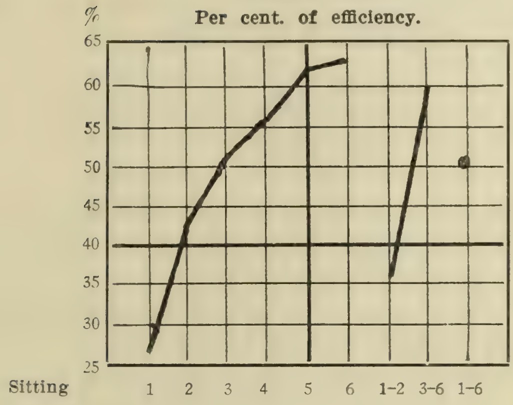
Per cent. of improvement.



GRAPH IV*a*.

Antonym Test.

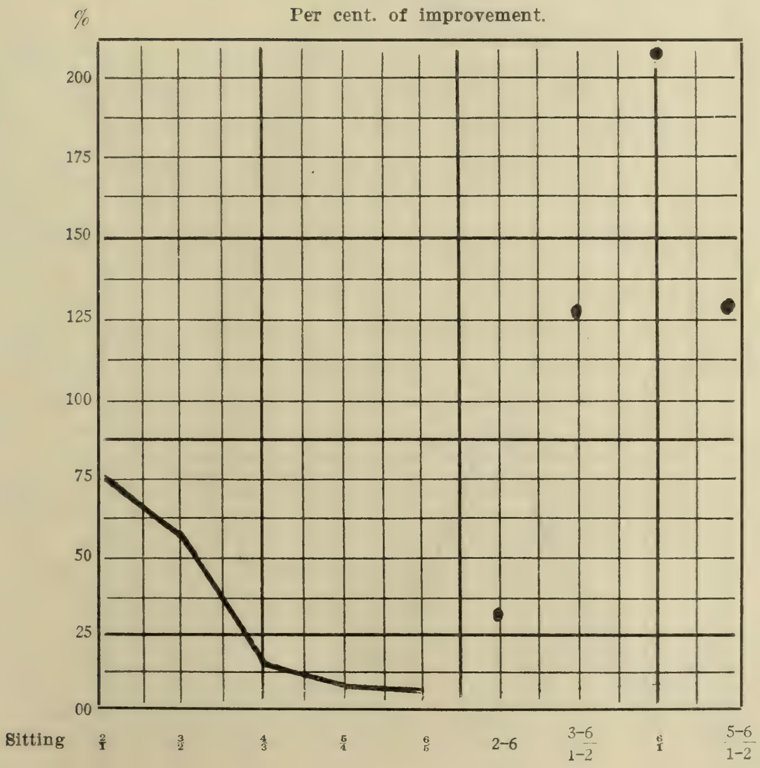
Per cent. of efficiency.



GRAPH IV*b*.

Antonym Test.

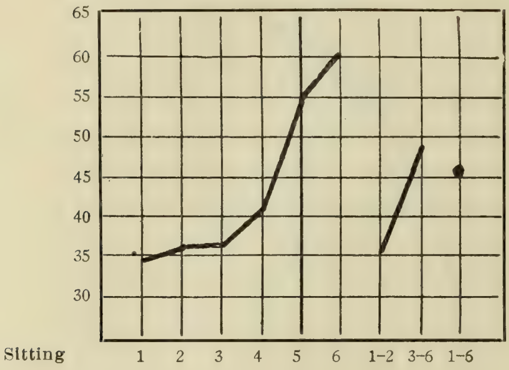
Per cent. of improvement.



GRAPH V*a*.

Cancelling A's.

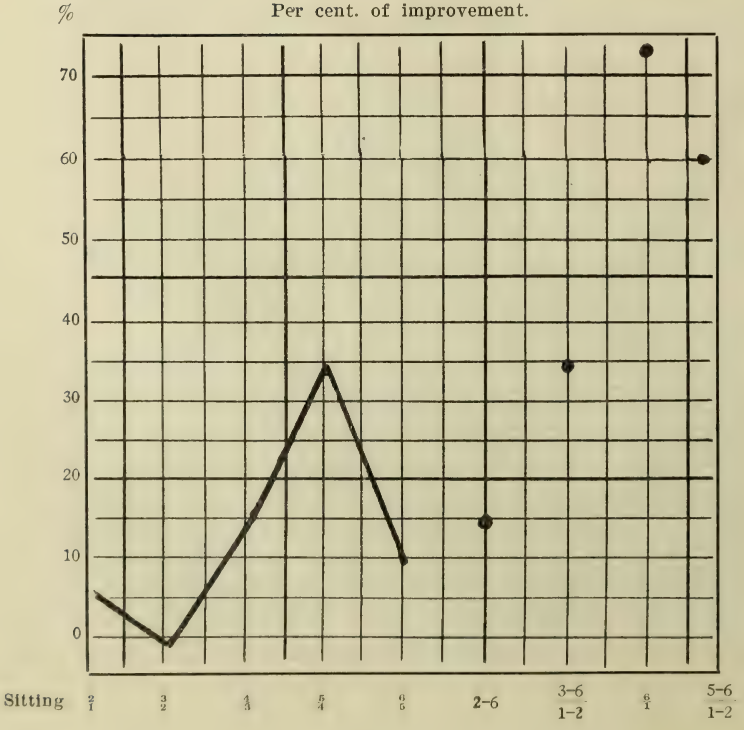
Per cent. of efficiency.



GRAPH V*b*.

Cancelling A's.

Per cent. of improvement.



THE ACCELERATING AND INHIBITING AGENTS IN THE ORAL SECRETIONS.

By PERCY R. HOWE, D.D.S., Boston, Mass.

A STUDY of the oral secretions with an aim to discover some effective means of inhibiting dental caries grows naturally out of the facts that are presented by bacteriology. It has been very fully demonstrated that the microorganisms concerned in tooth destruction are a class of fermentative flora, acting in carbohydrate media, and destructive to the substance of the teeth through the agency of the lactic acid that is produced by such a process. This is held to be the primary step, at least.

ANTISEPTICS AND ORAL BACTERIA.

The attempt to check this pathological condition through the destruction of the bacteria themselves has disclosed the fact that whatever will destroy the microorganisms will at the same time destroy the living cells. In a work on bacteria in general which I have chosen at random, an author says: "It is now known that the activity of these agents (antiseptics) is limited to the killing of bacteria outside the animal body." Metchnikoff, Wright, and other investigators of the manner in which the human organism disposes of invading germs and neutralizes their toxins, show that this is an elaborate and delicate physiological process, and widely different from our earlier conceptions. Dr. Miller expresses regret that he cannot find a material that will destroy the bacteria of tooth decay and that as well is suitable to be used in the mouth. This does not preclude the use of antiseptics in the mouth, but classes them as astringents, counter-irritants, or caustics, as the case may be. The writer has shown the coagulating effect of various antiseptic mouthwashes upon the oral secretions, and has recommended solutions that are in keeping with our more recent ideas. The results of a series of experiments he published in an article appearing in the DENTAL COSMOS for January 1905, and entitled "Dilute Saline Solutions in Oral Hygiene."

PROTECTIVE ACTION OF SALIVA.

The facts that the oral secretions present indifferent culture media for bacteria and that they possess no antiseptic properties lead bacteriologists to give them but passing attention. Yet why it is that a cut in a region teeming with bacteria heals with wonderful rapidity, and why it is that caries goes on in one mouth and makes no progress at all in another—with bacteria, culture media, warmth, moisture, and darkness always present—remains to be explained.

That the saliva possesses healing properties has been a matter of observation as old as history. It is in harmony with the principles of the human economy that its vital fluids possess qualities that are protective, and that safeguard its being—so that a close, comprehensive, and scientific investigation of these fluids must yield facts of great importance in regard to the condition known as dental caries.

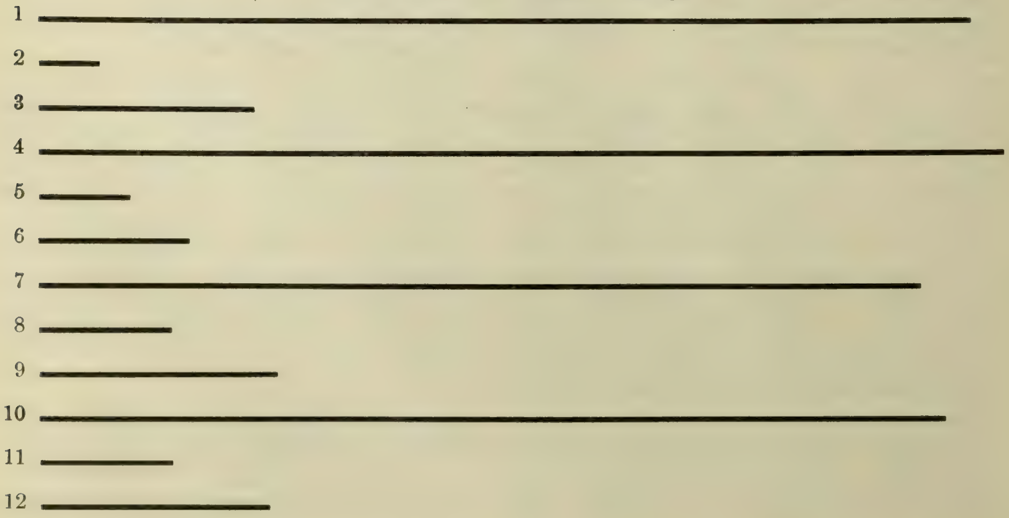
FACTORS INHIBITING OR ACCELERATING CARIOUS FERMENTATIVE PROCESSES.

More or less work has been done in this direction, but the reports have been meager, while announcement has been made of the presence of bodies that could not possibly have gone the round of the digestive enzymatic agencies, of absorption and of reconstruction, without setting aside every known physiological principle. Analytical procedures of such a nature as to cast great doubt upon the findings have in many cases led to confusion, so that, while much commendable work has been done in this di-

TABLE I.—SUGARS.
(Incubation 14 hours.)

Form.	H_2O. 1 gm.-5 cc.	Na_2HPO_4.	NaCl.	Culture lactic bacteria.	1 cc.	N/100 NaOH.
1. Maltose ...	1 cc.	0.1 gm.		1 cc.	"	15.0 cc.
2. " ...	"		0.05 gm.	"	"	1.4 "
3. " ...	"			"	"	4.0 "
4. Dextrose ..	"	"		"	"	16.0 "
5. " ..	"		"	"	"	1.9 "
6. " ..	"			"	"	4.5 "
7. Levulose ..	"	"		"	"	14.5 "
8. " ..	"		"	"	"	2.0 "
9. " ..	"			"	"	4.2 "
10. Glucose ...	"	"		"	"	14.9 "
11. " ...	"		"	"	"	2.0 "
12. " ...	"			"	"	3.6 "

Scale representing relative acidity.



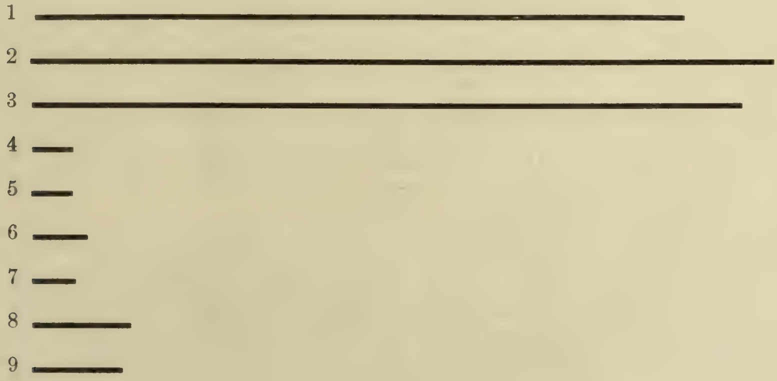
rection, it might be profitable to make an orderly statement of some of the conditions that we may reasonably assert to have an influence in inhibiting or in accelerating carious fermentative processes. The writer wishes, also, to present some experimental data that show the possibility of attaining this inhibiting or accelerating fermentative effect by bringing about those physiological actions which increase or diminish certain natural constituents of the salivary fluids, and which possess an almost controlling part in carbohydrate fermentation.

TABLE II.—STARCHES.

(Incubation 14 hours.)

Test tubes.	Na_2HPO_4.	NaCl.	Culture lactic bacteria.	Distilled H_2O.	1 cc.	N/100 NaOH.
1. Corn	0.15 gm.		½ cc.	"	"	5.2 cc.
2. Potato	"		"	"	"	6.0 "
3. Wheat	"		"	"	"	5.7 "
4. Corn		0.05 gm.	"	"	"	1.0 "
5. Potato		"	"	"	"	0.4 "
6. Wheat		"	"	"	"	0.5 "
7. Corn			"	"	"	0.4 "
8. Potato			"	"	"	0.8 "
9. Wheat			"	"	"	0.7 "

Scale representing relative acidity.



The facts so far brought out by the analytical work upon the oral secretions are few, so far as their bearing upon the question under consideration is concerned; we will, however, discuss them.

First, some report that the saliva in those cases that exhibit active and progressive caries is alkaline, others report that it is acid. That alkaline saliva is best suited for carbohydrate fermentation I hope to prove, not so much because it is alkaline, but because of the substance that makes it alkaline.

VISCIDITY OF THE SALIVA.

Viscidity is very generally classed as an accompaniment of this process. It seems to me that the part played by this condition is largely a physical one. The mucin, the serum albumin, the globulin, held in solution by the neutral and alkaline salts of the oral fluids, aid decay by an agglutinating action upon food particles, and again by furnishing material for the protective covering with which fermentative organisms of this type envelop themselves. Personally I have never seen any experimental evidence that these bacteria secrete their coverings, but have been led from my studies to hold to the opinion that they build this coagula about themselves out of the media in which their activities take place.

POTASSIUM SULFOCYANATE IN SALIVA.

The third and last topic that I wish to review is the introduction of potassium sulfocyanate into the system, which has been advocated as a means of inhibiting carious action.

It seems to me that the presence of the potassium sulfocyanate in the mouths of those that are immune to decay has not been so sufficiently demonstrated as to warrant the conclusion that it is a constant factor in these cases, or that it is the controlling factor the removal of which would change these immunes into susceptibles. The absence of sulfocyanates in many cases representative of extensive caries is probable. Indeed there are master-chemists like Hoppe-Seyler who believe the sulfocyanates to belong to the filth of the mouth. He says, "This substance may be found in dirty mouths." Others hold that it is an accompaniment of smoking, for they have found it oc-

TABLE III.—EFFECT OF DIFFERENT AMOUNTS OF Na_2HPO_4 ON ACID FORMATION.

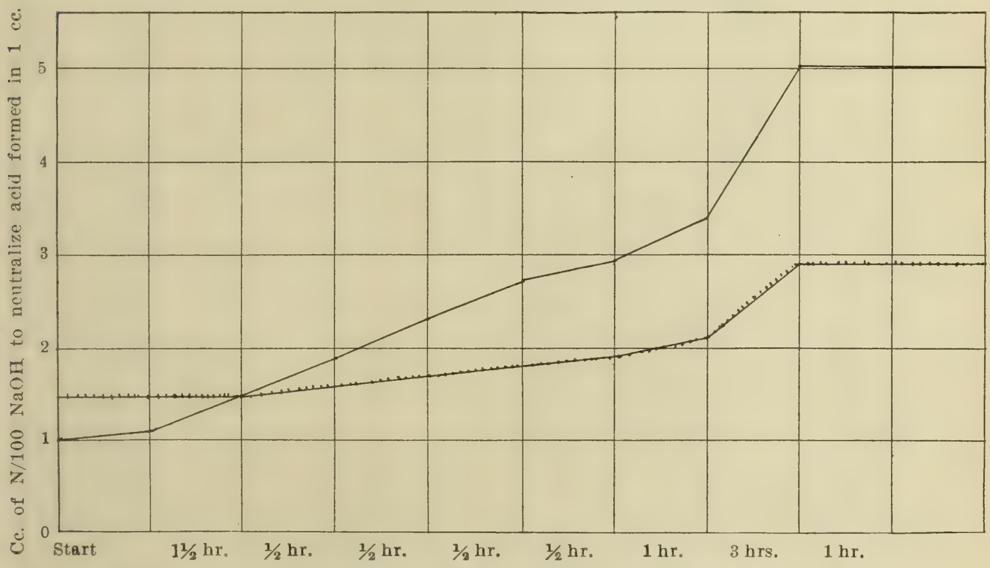
Na_2HPO_4.	Saliva.	Glucose 1 : 10.	Distilled H_2O.	1 cc.	N/100 NaOH.
	½ cc.	1 cc.	4 cc.	"	0.4 cc.
0.001 gm.	"	"	"	"	1.8 "
0.020 "	"	"	"	"	2.8 "
0.040 "	"	"	"	"	3.7 "
0.080 "	"	"	"	"	5.7 "

TABLE IV.—EFFECT OF DIFFERENT AMOUNTS OF NaCl ON ACID FORMATION.

NaCl.	Saliva and lactic bacteria.	Glucose 1 : 10.	Distilled H_2O.	1 cc.	N/100 NaOH.
0.001 gm.	1 cc.	1 cc.	4 cc.	"	0.25 cc.
0.020 "	"	"	"	"	0.2 "
0.040 "	"	"	"	"	0.25 "
0.080 "	"	"	"	"	" "

curring in the mouths of smokers. If it is always to be found in the uncontaminated secretions of the immunes, and is absent in those of the susceptibles, it is not yet clear how it acts so as to inhibit dental decay. Laboratory experimentation which shows that it in no sense restrains bacterial activity, but slightly augments it, has, I believe, been reported. Finally, any substance that goes the round of nutritional changes and appears in any glandular secretion unaltered may be safely said to be a substance foreign to that organism, and one which that system is eliminating as best it may, with the least possible injury to itself. Therefore, until we have more conclusive evidence that sulfocyanate of potassium is the inhibiting agent in this process of tooth decay, its universal adoption seems hardly warranted.

TABLE V.—RATE OF ACID FORMATION WITH AND WITHOUT DILUTE ADDITION OF SODIUM PHOSPHATE.



Plain line—In solution containing 0.15 gm. Na_2HPO_4, 2 cc. glucose 1: 10, 10 cc. H_2O, 1 cc. sol. lactic bacteria.

Notched line—In same solution minus the Na_2HPO_4.

SCOPE OF AUTHOR'S RESEARCH.

The following report of my recent research work is to demonstrate the action of phosphates on carbohydrate fermentation—to show that phosphates greatly increase the activity in lactic acid formation, and that they seem to be indispensable to this reaction. Next, to show the restraining action of the chlorids upon this kind of fermentation, and to point out thereby what may constitute an accelerating or an inhibiting condition of the oral fluids.

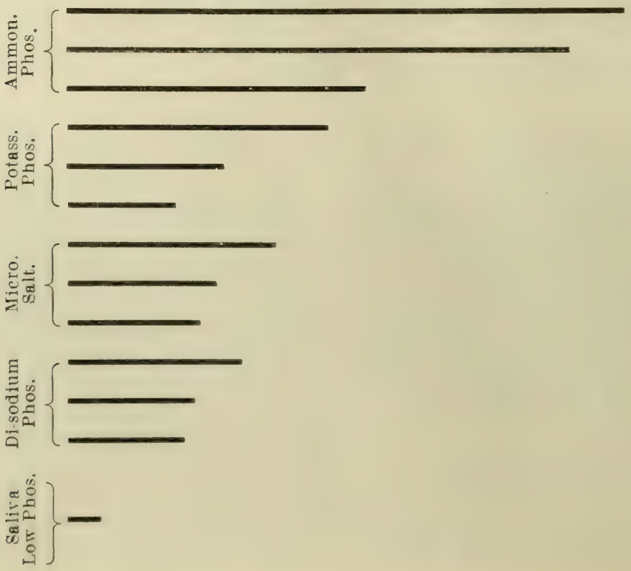
PHOSPHATES IN SALIVA WITH ALKALINE REACTION.

With phosphates present in the saliva (the method for determination I have indicated in the April 1912 issue of the DENTAL COSMOS), and with an alkaline reaction, we conclude that dibasic sodium phosphate is present, and this is the substance which plays the important part in the fermentations that produce the substance most important in tooth decay. If the saliva is acid in reaction, we may conclude that monobasic sodium phosphate is present. This, however, is of no great importance in the process. The

Table VI.

No. test tubes.	Ammonium phosphate.	Potassium phosphate.	Microcosmic salt.	Di-sodium phosphate.	Mixed saliva.	Glucose 1-5.	1 cc.	N/100 NaOH.	2/100 HCl.
	Gram.							cc.	
1	0.150				1 cc.	1 cc.	“	44.2	
1	0.150				“	“	“	44.2	
2	0.100				“	“	“	40.0	
2	0.100				“	“	“	39.0	
3	0.050				“	“	“	25.0	
3	0.050	Gram.			“	“	“	23.0	
1		0.150			“	“	“	20.5	
1		0.150			“	“	“	21.0	
2					“	“	“	12.5	
2		0.100			“	“	“	12.5	
3		0.050			“	“	“	8.5	
3		0.050			“	“	“	9.0	
1			“		“	“	“	16.0	
1			“		“	“	“	17.0	
2			“		“	“	“	12.0	
2			“		“	“	“	12.0	
3			“		“	“	“	11.0	
3			“		“	“	“	11.0	
1				“	“	“	“	13.5	
1				“	“	“	“	13.0	
2				“	“	“	“	10.5	
2				“	“	“	“	10.5	
3				“	“	“	“	9.5	
3				“	“	“	“	9.5	

Comparative scale of acid formation.



one reacts alkaline, the other acid, to phenol-phthalein, as I have shown in my article on "Indicators in Salivary Analyses" (see COSMOS for March 1911).

sufficient for the formation of the products of this type of fermentation. The resulting acid is determined by titration with N/100 NaOH.

TABLE VII.—CHLORIDS.

(Incubation 15 hours.)

			Mixed saliva.	Glucose 1–5.	1 cc.	N/100 NaOH.
		Gram.				
Ammonium Chlorid.	1	0.05	1 cc.	1 cc.	"	7.5
	2	"	"	"	"	7.5
	3	"	"	"	"	7.5
Potassium Chlorid.	1	0.05	"	"	"	3.3
	2	"	"	"	"	3.3
	3	"	"	"	"	3.3
Calcium Chlorid.	1	0.05	"	"	"	2.0
	2	"	"	"	"	2.0
	3	"	"	"	"	2.0
Sodium Chlorid.	1	0.05	"	"	"	2.3
	2	"	"	"	"	2.5
	3	"	"	"	"	2.4
	1	None	"	"	"	3.5
	2	"	"	"	"	3.5
	3	"	"	"	"	3.5

TABLES SHOWING IMPORTANCE OF PHOSPHATES IN ORAL FERMENTATION.

The accompanying tables will show that it is the phosphates that are to be considered, although alkalinity is an aid when effected by the proper substances.

Some of the sugars and starches are used for media, with inoculation directly from the saliva, or with cultures, as the case may be. The source of the inoculation is not material; in the mouth the source is traceable to the organisms present therein, as it is hardly necessary to state. The period of incubation is

Table I is the result of a series of experiments with sugars, and sufficiently shows the reactions in question. In addition, some experiments that I have made with sucrose give a proportional increase in activity and products upon the addition of a slight amount of Na_2HPO_4, demonstrating the restraining influence of NaCl.

Table II shows the same action carried on in some of the starches as found in ordinary food. The physical form of the starch granules seems to give a slight difference in the readings, although these are exceedingly accurate, and a slight difference is not material, being probably due to manipulation. The results are still self-evident.

Tables III and IV, respectively, give the results of the actions of Na_2HPO_4 and NaCl, as added in different amounts. The increasing proportion of acid formed with the Na_2HPO_4 is evident, but with NaCl the inhibiting action is as much with the lowest amount as with the highest.

TABLE VIII.—SULFOCYANATE POTASSIUM.

(Incubation 24 hours.)

Sulfo-cyanate potassium.	Saliva.	Dextrin 1–5.	1 cc.	N/100 NaOH.
	1 cc.	1 cc.		
0.100	"	"	"	1.2
0.050	"	"	"	2.3
0.025	"	"	"	2.2
0.010	"	"	"	2.2
0.005	"	"	"	4.7
	"	"	"	0.8

It is to be remembered that all these solutions are dilute.

Table V is of plotted lines showing the rate of action. The times of reading are placed below the chart, and the cc.'s, in tenths, used to neutralize the acid formed, along the side.

Table VI shows the activity induced by different kinds of phosphates, while Table VII is from experiments with different chlorids. Here is to be seen the augmenting action of ammonium in both phosphates and chlorids, so that ammonium chlorid is an exception to the statement that chlorids are to be considered as inhibiting the kind of fermentation in question and must be classed as an augmenting agent.

Table VIII shows the augmenting action of sulfocyanate of potassium as determined by titration.

Monobasic sodium phosphate is not favorable to much fermentation, as shown by a number of experiments that I have made to ascertain this point.

That the alkalinity of the dibasic sodium phosphate is not the principal reason for the activity of the fermentation which it causes is shown by making the saliva alkaline by other substances. This I have demonstrated by another series of experiments. With sodium carbonate added until slightly alkaline, carbohydrates added, and incubated, no acid is formed at the end of fourteen hours.

The saliva used in these experiments had an acidity of 0.042 per cent.; of P_2O_5, 0.03 per cent; chlorids, 0.3 per cent., and presents a saliva not favorable for carious action, but upon the slight addition of Na_2HPO_4 a most active fermentation begins.

This action evidently suggests many topics of interest, but it is not the purpose of this report to bring them forward.

It would seem reasonable, as a result of these experiments, to conclude that a saliva having a high phosphate determination, alkaline, and with low chlorids, is ideal for carbohydrate fermentation on account of the dibasic sodium phosphate present. A saliva with little phosphates or with phosphates and acid, indicating the presence of monobasic sodium phosphates, with a good chlorid indication, is inhibitory to such a fermentative process. With the phosphates removed by toluene, no fermentation takes place.

It is needless to remark upon the importance of this work to dental caries, or to point out that it is equally applicable to carbohydrate fermentation in other parts of the system.

THE EXTENT TO WHICH THE CASTING PROCESS MAY BE ADVANTAGEOUSLY APPLIED TO CROWN AND BRIDGE WORK.

By **HART J. GOSLEE, B.S., D.D.S., Chicago, Ill.**

(Read before the Northeastern Dental Association at its annual meeting, held at Portland, Me., Friday, October 27, 1911.)

THE full extent to which the application of the casting process may have revolutionized the practice of dentistry is of course difficult to determine, but it is safe to say that its influence has been and is now being felt to a greater or less degree by even the most obscure dentists in the most remote districts.

THE CONSEQUENCES AND POSSIBILITIES OF THE CASTING PROCESS.

Whether all who are now doing casting in some form or other will care to acknowledge it, or whether they will concede its revolutionary influence and the marked advancement made possible by its application, or not, may be a question, but that at least a very large percentage of dentists are doing casting, and that they are doing better work and doing it with infinitely greater comfort to their patients and with the expenditure of less nervous energy on their own part than formerly, cannot be questioned. That some operators are much more enthusiastic over its possibilities than others, and that some are obtaining much better results than others is also unquestionable, and is as interesting as it is true.

This, however, is but a natural sequence, and should be expected in any field of effort in which formerly accepted practices and methods of long standing become so completely revolutionized—and supplanted, if you please—in so short a period of time. The pedestals upon which the cherished reputations of so many prominent practitioners were built have been made to crumble and totter, almost in a day; old and young must begin anew and alike, and the application of this newer practice and its practicability must necessarily be tinctured with a saturated solution of personal equation. From the beginning, however, it has been interesting to note that those who were early to grasp the possibilities of casting, and hence have been and are still doing the most of it, are the most enthusiastic over it; therefore does it not naturally follow, by the same rule of thumb, that those who were first to grasp and accept its wonderful possibilities, who have been and are still doing the most of it, and who are most enthusiastic over it, are also the ones who are obtaining the best results?

While it may be true that the proportion of those operators who ever attain to the very highest achievements in any mechanical pursuit is not a large one, still I am of the very firm belief that the casting process has afforded an opportunity for raising the standard and increasing the percentage of uniformly good results, and in the light of our present achievements, this standard will become higher and higher in proportion as we recognize our own personal limitations and realize the full scope of the possibilities of this innovation.

Those who, by a process of self-analysis, may thus recognize their own limitations, will not expect a mechanical process or a machine of any make or kind to adjust and adapt itself to the varying and intricate demands of an exacting line of work unless the process is followed, or the machine operated, with an average degree of human intelligence; but those who fail to recognize this are surely destined to meet with failure. Thus it is more than probable that many may have failed in attaining to the heights of even average success simply because they expected too much of the process involved, and exacted too little of themselves; but operators of this class never become enthusiasts, and those who never become enthusiasts rarely become experts in any line.

INDIVIDUAL CORRECT AND ACCURATE TECHNIQUE REQUIRED.

Enthusiasm, expertness, and all that goes to make for and insure success in the application of any mechanical process can after all come only from the "man behind the gun," and hence the operator who aspires to such success must be willing to acknowledge this fact and contribute his share. And in this instance his share is in the form of ammunition, and the ammunition now needed most of all is correct and accurate technique. While the factor of personal equation will necessarily demand a more or less different technique from each and every operator, yet the most scrupulous attention to details and the utmost accuracy is necessary in each instance, and as such a technique is to be acquired only at the expense of time, thought, and energy, it is scarcely purchasable, nor may it result from delegating important parts of the work to laboratories or to inexperienced or unskilled assistants, as is a common but bad practice.

When the average operator realizes these essentials to success, then the average operator may reasonably hope to rise above the average and to achieve success in the application of the casting process, and as he appreciates them, so will he also find the field of usefulness broaden and the possibilities become more and more unlimited.

THE UNLIMITED FIELD OF APPLICATION OF THE CASTING PROCESS.

If there were, however, no field to which the casting process may be applied other than the one which embraces the filling of teeth, what a long-felt want would it still supply, what a broad field of usefulness would it occupy, what a priceless advancement would it mark in the preservation and restoration of the teeth, since it is now generally conceded that the inlay affords a better, quicker, less painful, and probably, on the average, more permanent character of operation.

Granting all of this to be true, however, the limitations of this process have by no means yet been reached. Indeed, it seems that it is still only in its infancy, and that the field of its usefulness as applied to all other phases of practical dentistry is as broad and far-reaching as is the degree and character of success already insured in the filling of teeth.

While this is undoubtedly true, to a greater or less extent, as applied to the whole field of dental prosthesis, it is particularly true as applied especially to the subject which it is my purpose to discuss at this time—that of crown and bridge work.

COSMETIC APPEARANCE AND STRENGTH AFFORDED BY CASTING IN CROWN AND BRIDGE WORK.

But a very few years ago this field of our work, which many of us are now pleased to designate and dignify as a "specialty," was but an indeterminable collection or mass of empirical details. Almost every dentist had his own ideas and his own methods, and each differed from the other to such an extent as to confuse the teacher and bewilder the beginner in every respect and direction except one, the display of gold. For many years patients wearing crown or bridge work, however limited or extensive in character, were involuntary advertising mediums for dental jewelers, and were forced to display shocking evidences of a handicraft in some instances useful perhaps, yet whose interventions were usually far short of art and always more or less repulsive.

These evidences, I am sorry to say, may still be observed, but fortunately not to the same extent. As a profession we are beginning to strive for higher ideals in the artistic phase of our work, and in this respect we are aided materially by the demands of an ever-increasing degree of culture on the part of our patients.

MORE PORCELAIN AND LESS GOLD.

Since porcelain has always been and is still the one substance which most closely simulates nature and therefore best meets the requirements, this fact, together with these combined ambitions on the one part and demands on the other, must lead one to conclude that more porcelain and less gold must be used in an effort to satisfy each.

While this was recognized many years ago, yet, with the inherent element of structural weakness so characteristic of porcelain—and so often learned from sad experiences—together with the knowledge that cosmetics were but one requirement, and that in the construction of all forms of crowns and bridges the actual mechanical requirements of strength and accuracy of adaptation must necessarily receive first consideration, it is no great wonder that cosmetics were accordingly sacrificed.

If it were not, and if it is not possible to satisfy both of these requirements at one and the same time, then cosmetics should be placed second to or sacrificed for the purely mechanical; but the possibilities of casting offer an opportunity for obtaining all of the combined requirements to the very highest degree, hence its application may be made to practically revolutionize all of our former methods.

This is possible because the casting process, if skilfully utilized, insures, first, accuracy of adaptation, second, a maximum of strength with a minimum of gold, and in proportion as the amount of gold necessary to insure strength may be decreased, the amount of porcelain may be increased. Thus, if our work be properly constructed, less gold and more porcelain may be safely and successfully used, and the suggestions which I have to offer along these lines are based entirely upon the theme of more porcelain and less gold, with equal and adequate strength.

ADVANTAGES OF ALL-PORCELAIN TEETH OVER FACINGS IN CROWN AND BRIDGE WORK.

Such manifestly desirable advantages are now to be obtained by means of a skilful application of the casting process, combined with a more general use of all-porcelain teeth instead of the ordinary thin facings. It will probably be conceded that this type of tooth is preferable in single artificial crowns, because it affords better form, better color, and greater strength than are possible to obtain from the use of facings. Besides, an all-porcelain tooth is better for bridge work because the presence of an occlusal surface of porcelain instead of gold on any or all of the posterior teeth is advantageous not only for cosmetic and hygienic reasons, but for actual masticatory purposes as well.

These advantages are so evident that the esthetic operator has been forced to look and hope for some form of tooth and some method of application which would eliminate the inherent weakness of thin facings, and the objectionable features incident to their use.

THE SHORTCOMINGS OF CERTAIN METHODS OF ATTACHMENT OF CROWN AND BRIDGE TEETH.

To overcome the shortcomings of the so-called Richmond crown and of the ordinary bicuspid and molar dummy with porcelain facing and gold cusps, the advantages of some form of interchangeable or replaceable all-porcelain tooth, more closely simulating the form and color of the natural teeth, were early recognized. As a result of this recognition many types have been introduced, but until very recently most of them have been of the thin-facing variety, and applicable to the anterior teeth only.

While all-porcelain teeth, such as the Davis, Logan, and Justi crowns, have always been recognized as representing the nearest approach to an ideal substitute for the natural teeth, yet they were not originally designed to meet the present requirements of crown and bridge work, and hence their use has been confined to that class of cases in which more or less temporary results were all that was expected or demanded.

If the esthetic and hygienic advantages possessed by this type of tooth, however, could be combined with those of exact adaptation and uniform and adequate strength, and if to these might be added the further advantages of its being attachable by cement instead of solder to the basic structure, and of being replaceable and more or less interchangeable, it is evident that our efforts would be a nearer approach to the ideal.

In my opinion, which has been often expressed, the attachment of porcelain teeth or even facings to the metal structure by means of soldering or of direct casting is wrong. It is a wrong principle because the porcelain is subjected to a degree of heat which must endanger its structural integrity and influence the preservation of its color; because the tooth or facing is thus attached in a stiff and rigid manner, and being friable, is more likely to fracture under the stress of mastication, and because in the event of accident, no favorable opportunity for repair or replacement is usually afforded.

ADVANTAGES OF CEMENTATION OF CROWN AND BRIDGE TEETH.

It will therefore also be agreed that the elimination of these objectionable features must necessarily constitute an improvement, and that such an improvement is to be obtained by the use of replaceable teeth attached to the supporting metal structure only by means of cementation. An experience of many years has proved that this means of attachment is reliable in proportion as the adaptation of the metal to the porcelain may be close and accurate, or, in other words, in proportion as the porcelain may be "boxed up," protected and supported. Porcelain is stronger when so attached because it is not subjected to any degree of heat, and is not held so rigidly, owing to the cushion-like effect afforded by cement, and because, not being held so rigidly, it is less likely to become fractured. Furthermore, the color is never changed; the dark blue marginal outlines due to the penetration of saliva between the backing and the facing are absent, and opportunity and facility for replacement in the event of accident always presents.

As I have previously stated, these possibilities and advantages are to be adequately obtained only in some form or type of tooth which presents as much porcelain as possible, this porcelain not being weakened by the presence of metal pins nor by the provisions for retention, and possessing, therefore, a maximum of strength. Moreover, this type of tooth must be of natural form and more or less universally applicable, necessitating but a minimum of grinding for effecting the desired and required adaptation.

This latter feature, as applied to the retentive surface, is essential, because in proportion as a given form of porcelain tooth will require but little or no grinding upon this surface in effecting its adaptation to the requirements of the individual case, may it be expected to be replaceable or interchangeable.

ADVANTAGES OF KEEPING DUPLICATE TEETH.

A further advantage made possible by the use of replaceable or interchangeable teeth, which applies particularly to especially difficult cases, is to be obtained by making duplicates, and while it is true that any form of interchangeable tooth is far less likely to become broken from the stress of mastication, yet the making of duplicates coincidently with the initial construction requires but little time and always affords inestimable protection to the patient and unlimited relief and satisfaction to the dentist. It is therefore a safeguard which might be observed often and profitably by everyone whose necessarily small fees do not render it prohibitive.

In all instances, however, whether duplicates are made or not, the color number and mold number of each tooth used in every case should be recorded on the card or ledger sheet, and thus made a permanent part of the record. Because of these advantages and for these various reasons I firmly believe that only some form of interchangeable tooth should ever be used in single crowns or fixed bridge work of any type, if the best results and highest possibilities are to be attained in our efforts.

METHODS OF APPLICATION OF THE CASTING PROCESS IN CROWNS AND BRIDGES.

In addition to such desirable improvements as may be achieved by the use of teeth of this character, the introduction and application of the casting process has placed this field of our effort upon a more systematic and practical basis, as an evidence of which permit me to call your attention to the methods which I am now generally employing, almost to the complete exclusion of all other and former procedures.

SINGLE CROWNS.

For the ten or twelve anterior teeth, or all teeth within the range of vision, where porcelain is demanded, the all-porcelain replaceable or interchangeable crown, with cast base and with or without a band as the requirements may indicate, is used in a very large percentage of cases. It is undoubtedly the strongest, most artistic, and most universally applicable type of substitute for the natural tooth, and in all respects is second only to a skilfully adapted jacket crown. Indeed, for the average dentist it is better, and more quickly and easily made; moreover, it possesses an advantage over the jacket crown in that immediate replacement in the event of mishap is possible.

PORCELAIN CROWNS WITH CAST BASE.

In the construction of this type of crown much difficulty has heretofore been encountered in molding the wax to a close adaptation to both the root-end, particularly at the periphery, and the base of the crown, and in holding the dowel or dowels in the proper position to insure correct alignment. These essential features have usually been so uncertain and in some instances so difficult and so unsatisfactory, as to cause me to work out and suggest a technique which eliminates such uncertainty, insures accuracy, is applicable alike to all cases, whether a band is required or not, relieves the patient of all discomfort, and has proved the most satisfactory method of crown construction I have ever followed.

In the various methods now generally used and advocated, good, accurate, reliable results are difficult to obtain, because the very plasticity of wax of any kind imparts to this material a tendency to spread when subjected to the pressure necessary to mold it to a close adaptation. This tendency is best and most easily overcome by first adapting 38-gage pure gold to the root-end, which may be done either by swaging or burnishing, and then adjusting the dowel, tacking it to the base with solder, and subsequently molding the wax to both base and tooth, and casting directly to this disk of pure gold. If this procedure is carefully done the surface thus obtained will always provide, with any investment material now procurable, a closer fit to the root-end than can be obtained from the molding of wax alone, and will require no finishing whatever after casting.

Such a procedure also reduces to a minimum the possibility of any change of form which may result from the warpage or shrinkage of the gold or alloy used in casting, but in order to obtain the best results the impression and die method must necessarily be employed as explained in detail in the DENTAL COSMOS for August 1911.

This entire process requires but little time, is simple, insures a more or less perfectly adapted base, and one which is obtained without the slightest discomfort to the patient, which is not possible when burnishing directly to the root-end is attempted. For single crowns a slight lingual lip or band is usually all that will be required. This strengthens the attachment between crown and root, and precludes the possibility of subsequent fracture of the root, for which purposes a band is usually employed; but in all cases where the crown is to be used as a bridge abutment, a full band should be used.

The construction of a crown by this method usually involves but three short sittings, and the best results are to be obtained by doing all the work directly in the mouth. At the first sitting the root is prepared, the root impression taken, the mold number and color selected, and a temporary crown mounted. This latter feature is desirable as a means of packing the soft tissues away to afford and insure a free exposure of the root-end for the next sitting, as well as to relieve the patient of temporary embarrassment. The amalgam die having been made, the pure gold disk swaged, and the tooth selected in the interval, at the second sitting the cap is fitted to the root and the dowel and tooth are adjusted to suit the requirements. The dowel is then soldered to the cap and the relation between the tooth and the cap secured with casting wax. The crown is then cast, the tooth cemented to place and finished, and the final mounting is made at the third sitting.

GOLD CROWNS.

For second and third molars, and even first molars, when the presence of gold is not objectionable, the cast gold crown affords results far in advance of anything heretofore obtained. In the construction of gold crowns by the casting process, however, the fit or peripheral adaptation is, because of the spreading tendency of wax, always best obtained by previously fitting some form of band to the root and then casting directly to it.

Technique. Whenever it is desirable to exaggerate the contour, a narrow band of platinum or 22-karat gold of about 30 or 32 gage should first be made to fit snugly around the entire periphery, and then trimmed to approximate evenly the end of the root, after which all of the contouring may be done in wax, which can perhaps be best achieved on a model. When an exaggerated contour is not required, however—it seldom is—the band may be made of 28-gage 22-karat gold, and fitted and contoured in the usual manner. When the band is in position on the root, casting wax is molded to the end of the root inside the band, and this procedure is followed by securing in the wax an imprint of the opposing teeth in all the movements of mastication.

After the band has been removed, its interior should be filled at once with casting investment material, and the occlusal surface properly carved, after which the piece may be invested and cast, using for the casting the same grade of gold of which the band was made. If the band is thoroughly clean before investing and the gold to be cast is of good quality and highly fused before casting, a good physical union will usually result; otherwise a small bit of 22-karat solder will insure the same result.

These two general types of crowns will meet the requirements of single crown work in a very large majority of cases, and the results obtained by either method are far more accurate than those obtainable by any of our former methods.

FIXED BRIDGE WORK.

In fixed bridge work, which constitutes an assemblage of attachments and intermediate dummies, our work may also be simplified, because three general types of attachments and three general types of dummies will be found to meet the requirements in an exceedingly large percentage of cases.

Attachments. The methods of obtaining attachment to the supporting teeth or roots embrace the porcelain replaceable crown with dowel and cast base, the construction of which has just been referred to as applied to the roots of anterior teeth or when it is impossible or inadvisable to preserve the natural crown; the inlay, when the attachment is to be made to the crown of a natural tooth, which is good practice when the remaining natural crown is sufficiently strong, and the gold crown for the molars when the use of an inlay is for any reason not indicated.

As has been previously emphasized, wherever a dowel crown is to serve as an attachment for bridge work, a narrow band should always be used. In my opinion this is absolutely essential, because of the additional strain to which the root is to be subjected, and as a means of insuring permanence and precluding fracture.

When an inlay is to serve as an attachment, the cavity preparation is of course exceedingly important, and some form of post or posts should always be used to insure stability and as a provision against the inlay becoming loosened by the strain and possible torsion to which it is subjected.

The general applicability of the inlay as an attachment for bridge work has been a subject of considerable discussion ever since casting became an accepted practice. It will undoubtedly serve the purpose as well as and in some respects even better than a full crown, providing its adaptation and stability are insured. The former depends first upon adequate and proper cavity preparation, and then upon careful technique in making the inlay; the latter depends upon the use of a proper alloy in casting and upon pins or posts of some form, for the reasons mentioned.

Whenever the walls of the supporting tooth are sufficiently strong to insure permanence, whenever a suitable cavity may be properly prepared and the inlay is well seated and securely anchored, and made of a hard alloy—such as five per cent. platinum in pure gold, coin gold, or 22-karat gold—I am of the impression that such an attachment is often better than a full crown, because of the absence of any possibility of gingival irritation, such as is so often present when the full crown is used.

The cavity preparation for such inlays does not differ essentially from that for a simple filling, except that its buccal, lingual, and cervical margins must be so extended as to carry the margin between tooth and filling beyond any actual contact of the artificial tooth to be supported by it, in order that each and all of these margins may be exposed, for hygienic reasons.

DUMMIES.

As dummies for fixed bridge work, three general types will answer the requirements in all cases.

The all-porcelain replaceable crown and bridge tooth with cast backing is adapted to all positions in the arch where the conditions of absorption and occlusion will permit of its use, and is undoubtedly the ideal form of artificial substitute. Backings for these teeth should usually be cast separately, though they may be made in sections involving the number of dummies between the attachments, which should never exceed three or possibly four. Better form, cleaner interproximal spaces, and less display of gold, however, are obtained by making each backing separately.

As a means of preserving the proper relation of the short sustaining post which holds the tooth to the backing and of insuring a smoother surface adaptation of the backing to the porcelain than the ordinary casting investment materials afford, in using this type of dummy a thin backing of about 38-gage pure gold should be previously swaged to the tooth, and the small retaining post then soldered to it. It is then always necessary to allow as much surplus end of post as possible to extend, in order to insure strength in the final attachment of this essential part to the completed backing.

Casting wax may then be molded to the required form, and the casting made directly upon and against the thin gold backing, by which method any distortion or possible misfit due to shrinkage or warpage is overcome, and the most finished, accurate, and reliable results are insured.

In the use of this type of tooth in all cases in the upper arch where complete absorption has already taken place, the most sanitary form of structure is usually to be obtained by molding the wax so as to restore or approximately follow the lingual form of the tooth, but tapering down to a narrow saddle at the point of contact with the soft tissue. As a rule, and contrary to the opinions of some operators, wherever the adaptation is good such a type of construction will be found to be far more sanitary than the usual recesses, shelves, and pockets so common in the ordinary methods.

In the formation of this type of saddle, the desired results may be best obtained by first burnishing the same thickness of pure gold to the model, between the finished abutments in position thereon, and then trimming it to conform to the size of the necks of the teeth to be supported by it. The general form of the structure may then be made by filling in between this saddle and the backings with wax, after which the piece may be invested and cast. In instances where it is exceedingly small, this space may be filled with solder.

In this more or less typical fixture [exhibiting] it will be observed that practically no gold is displayed anteriorly to the second molar, and yet that a maximum of strength is present throughout.

In cases where complete absorption has not occurred, a saddle is of course contraindicated, but in these cases the neck of the porcelain tooth should accurately fit and should bear firmly upon the soft tissues, and the lingual surface of the backing should then be so formed as to be as nearly convex or self-cleansing as possible.

For those cases in the anterior region where abnormalities of occlusion or elongation of the opposing natural teeth demand a thin facing, the ordinary type of long-pin facing may be used. In its use, however, the best results are to be obtained by previously backing it up with thin pure gold, adding wax to this to the desired form, removing the facing, and casting. The pins may then be threaded and when the backings have been assembled with solder, the facings may be cemented to position, thus obtaining all of the previously mentioned advantages of cementation, combined with better form and more uniform strength.

In addition, in those cases, particularly in the lower arch and in exceedingly close bites, where cosmetics are not a factor or where the extent of absorption or the elongation of opposing teeth precludes the use of porcelain in any form, the all-gold cast dummy may be used. Such dummies may be made to conform to the requirements of occlusion, adaptation to gum—if such is required—and contact with the attachments, in wax, and then invested and cast in one piece. This type of dummy is useful in supplying the lower second bicuspids and first and second molars, and may include only the occlusal surface, thus forming the so-called "self-cleansing" type of bridge, or the entire tooth with or without a saddle, as the requirements may be. The former type of construction is indicated only when there is an excessive degree of absorption, which will permit of sufficient space between the gum and occlusal surface to insure self-cleansing properties, and wherever this space is not great enough to be easily kept clean, direct contact with the gum will afford a more hygienic result. In other words, there should be plenty of space or none at all. A typical case of this kind, showing the use of all-porcelain dummies in connection with inlays, is shown [illustrating].

With these, the problem of attachments and of intermediate dummies for almost universal application is simplified and systematized.

The remaining feature incident to the construction of all forms of fixed bridge work involves only the proper assemblage of the various parts. While some are casting all attachments and backings with an alloy of five per cent. of platinum in pure gold, and subsequently assembling them with pure gold, thus using no solder whatever, still a good grade of 22-karat gold or coin gold may be used with equally good results. When either of the latter is used the final assemblage may be affected with 22-karat solder, and providing there is absolute contact between all of the parts to be united, the procedure is thus somewhat facilitated and the results are uniformly good.

REMOVABLE BRIDGE WORK.

The same general ideas are also applicable to the construction of removable fixtures.

For this class of work, also, three general types of anchorage to the supporting teeth or roots will be found to meet adequately the requirements of the average case. These embrace clasps, the telescoping tube and split post, and the various forms of manufactured attachments.

Wide clasps encompassing three angles of the tooth, provided with an occlusal rest, not cast but made of heavy rolled clasp-metal alloy, probably afford the very best means of obtaining anchorage to the natural or artificial crowns of bicuspids and molars.

That clasps should not be cast is especially emphasized, because the molecular rearrangement resulting from casting most of the alloys available at present destroys to a greater or lesser extent the very qualities of strength and resilience demanded of them, which undoubtedly obtain best in a rolled or drawn metal or alloy.

In all forms of removable bridge work or partial dentures, where clasps are used, some form of occlusal rest is necessary as a means of providing against subsequent settlement of the case. If this precaution is not observed, complete loss of occlusion and usefulness will soon follow. The telescoping tube and split-post attachment is also useful when confined to the roots of the six anterior teeth.

The Roach, Morgan, and other types of manufactured attachments will also be found valuable when used in connection with either porcelain or gold crowns or inlays on the canines and bicuspids.

A NEW TUBE-AND-POST ATTACHMENT.

In addition to these, I am pleased to offer an entirely new method of attachment which, while perhaps but a modification of some of the previously mentioned types, is entirely original, and more or less universally applicable.

This attachment consists in utilizing the grasping principle of an open tube with straight and parallel sides, which is the removable part of the fixture, in combination with a round wire, of about 12 gage, attached to and therefore a part of the fixed portion of the structure, but lying in a horizontal position instead of in a vertical one, in its relation to the supporting fixture.

Such an attachment may be made by utilizing the tube of a Roach attachment in combination with 12-gage clasp-metal wire; and while simple and easily constructed, it is especially useful in extensive cases, where the abutment pieces are assembled, though it is equally applicable to less extensive or to the most simple cases.

It is easily applied, easily tightened when loosened by wear, takes up but little space, does not require absolute parallelism when more than one is used on the same fixture, is applicable alike to either gold or vulcanite work, and is secure. Its recent use in many cases has afforded me greater satisfaction than all of the other methods of attachment for removable fixtures combined.

I have recently been informed that a similar type of attachment, known as Gilmore's, is now on the market, and may be easily procured, which will be an advantage to those who do not care to make it.

CASTING LARGE PIECES.

When the type or types of attachment thought to be best indicated have been selected, adapted, and completed, the casting process offers splendid opportunity and great possibilities for the subsequent formation of the body of the fixture, and in this connection I may confidently assert that I believe that the successful casting of large pieces is only a question of the development of proper technique.

In the construction of cast bases, if a good model of a high-grade investment material is obtained, and if the wax base is carefully formed, made sufficiently thin, and properly stiffened, the process offers the same assurance of accuracy of adaptation and of strength as previously indicated, and the possibilities are equally unlimited. For all forms and sizes of saddles or bases coin gold seems to be especially adapted to cast work, and to afford all of the integral strength ordinarily demanded.

In the presentation of much of this technique, quotations from former papers have been necessary to a greater or less extent, but the fact that repetition is made to serve in preference to changes and alterations only proves that I am still courageous in my previous convictions.

As a final suggestion, permit me to emphasize again the advantages of simplifying and systematizing the methods employed in casting, the necessity for careful technique, and the unlimited possibilities resulting therefrom.

CORRESPONDENCE.

ON THE FITTING OF A GOLD CROWN OR BAND.

To the Editor of the Dental Cosmos:

Sir,—In fitting gold crowns the operator will find it much more pleasant to both dentist and patient if he will observe two things which have, I believe, been erroneously taught.

First: Fit the crown *snug,* but never tight enough to require the use of a mallet to drive it on.

Second: Fit the crown with the patient in the chair. Take plenty of time, and fit the edge of the crown all around to just reach the gum so that there will be no tooth substance showing; but never crowd the edge, anywhere, *under* the gum.

In so doing the dentist will avoid several consequences:

First: Pain.

Second: A bluish and congested gum tissue wherever the metal forces it away from its natural position.

Third: In a great majority of cases there will not occur the shrinking away of the gum tissue from the edge of the crown—as we find in most cases where the metal is forced under the edge.

Yours respectfully,
H. F. Gleason, M.D.

Malden, Mass.

Editorial Note.

The foregoing suggestions with reference to the fitting of a gold crown or band upon the tooth-root are undoubtedly in the right direction. We deem it opportune, however, to direct attention to another phase of this question—involving as it does the adaptation of a mechanical device in harmonious contact with vital tissue.

In the technique of cavity preparation and cavity filling, the development of operative standards has proceeded to a point where every practitioner must accept the truth of the fact that anything short of perfect adaptation of filling material to the cavity margin falls short of a perfect result and is representative of faulty manipulation. It is equally conceded that overlapping of cavity margins by filling material constitutes a defective operation and a condition which invites recurrence of carious action, for the simple reason that such overlapping fillings furnish retention places for the harboring of bacteria and the substances upon which they develop their activities. In short, perfect adaptation of filling material to enamel margins without overlapping edges of filling has become the ideal of operative dentistry—an ideal which is practically attainable by operators of even average skill.

Precisely analogous conditions relate to the adaptation of gold crowns or banded crowns to the roots of teeth, and until the technique of prosthetic dentistry has attained a perfection which will make possible the adaptation of these bands to root-ends without overlapping material—in short, until the joint between the band and the root-end can be made as perfectly as the joint between a filling and the cavity margin as now made in operative dentistry, all such operations will be defective, in that they become sources of irritation and infection to the vital tissues with which they are associated.

There is yet much to be done before the banded crown in any of its modifications can be brought up to the standard here outlined, and until such a standard is attained the banded crown will be fundamentally defective from a physiological and pathological point of view.

PROCEEDINGS OF SOCIETIES.

SEVENTH AND EIGHTH DISTRICT DENTAL SOCIETIES OF THE STATE OF NEW YORK.

Forty-third Annual Union Convention.

THE forty-third annual union meeting of the Seventh and Eighth District Dental Societies of the State of New York was held in the Iroquois Hotel, Buffalo, N. Y., November 9, 10, 11, 1911.

The meeting was called to order on Thursday afternoon, November 9th, at 2 P.M., by Dr. LeRoy Requa, Rochester, N. Y., president of the Seventh District Society.

The first item on the program was the address by the president of the Seventh District Society, Dr. Requa, which was followed by the address of the president of the Eighth District Society, Dr. R. E. Luther, Batavia, N. Y.

The next order of business for the afternoon session was the reading of a paper by Dr. H. A. PULLEN, Buffalo, entitled "Expansion of the Dental Arch and Opening the Maxillary Suture in Relation to the Development of the Internal and External Face."

[This paper is printed in full at page 509 of the present issue of the COSMOS.]

Discussion.

Dr. A. E. SAGER, Rochester. The paper as presented is considerably modified from the copy that I received before the meeting, and in some of the conclusions on which I wished to take issue with Dr. Pullen he has more or less taken the wind out of my sails. I have hardly ever listened to a paper which showed more conclusively the beneficial results to be achieved by spreading the dental arches.

The essayist has laid emphasis upon the separation of the dental arches at the maxillary suture. It seems a very opportune time just at present for threshing out the question as to whether such a procedure is advisable at an early age. The child's health and temperament, of course, will have to be taken into consideration in each case. In some cases, I should say, such an operation would not be advisable at all, and would have to be left out of consideration. I have no doubt, however, that markedly beneficial results would in some cases be obtained by the enlarging of the breathing capacity of the nasal passages, but, to use the essayist's words—"As to its influence upon the developing dental arches, nothing has as yet been deduced, and it must not be thought that it solves the question of arch development, since there are areas or zones in each lateral half of the upper dental and maxillary arches which need development, and which this method does not reach, and which are responsive only to the mechanical stimulation of arch expansion in the usual manner, provided bodily movements of the teeth are secured."

In my opinion this question hinges right here: If these cases presented themselves with nothing more to be done than simply spreading the arches laterally, there might be some excuse for opening the maxillary suture in a short time, providing it could be done painlessly; but they do not. They almost invariably present themselves with the additional complication of malocclusion. This being the case, spreading the suture means making two operations of something that can be done in one, or extending the operation over a much longer time, which means longer retention, and we know that long retention of deciduous teeth interferes to some extent with the normal eruption of the permanent teeth. I believe the developmental possibilities, the benefits to be derived in the other sections of the face, are greater from the expansion of the dental arches in the usual way, and I question whether it would be advisable to abandon the beneficial results which we know we can obtain by slow expansion, simply for the sake of quickly opening the maxillary suture.

In every child you will find some sort of occlusion. The vicious cycle has not yet done its work, and if you spread the suture in such a short time, what is to become of the lower arch? You will find that in the lower arch you have no occlusion at all; therefore, in my opinion, this factor must be considered in each individual case. The cases shown on the screen are selected cases, and the occlusion of the lower arch was such that the spreading of the suture did not make any difference with the occlusion, but in most cases I should say that it would make a great difference. By spreading the suture quickly you would spoil the occlusion of the lower arch, which is not done by normal expansion of the dental arch.

Dr. W. H. Ellis, Buffalo, N. Y. I am very glad to discuss a paper of such importance and one of which I so heartily approve. As I agree in the main with the essayist, I can merely emphasize, perhaps, a couple of the points considered.

This is indeed the age of the child. Never was there a time when child welfare in all its branches received more careful consideration. I can think of no more noble or interesting work than assisting in this movement by our own efforts. We have known for years the vital importance of modern scientific orthodontia for the child in the type of cases under discussion, but only recently have our medical *confrères* and the laity granted us full recognition. A few years ago what demand there was for orthodontia was due to hoped-for improvement in facial and dental contour only, and but little was thought of the effects that are today known to be of such paramount importance.

This paper well shows that orthodontia involves not only the correction of dental irregularities, but that it is a part of medical science, assisting in the correction and eradication of many difficulties supposedly limited to the field of the rhinologist. Widening of the nasal chambers by expansion of the palatal arch obviates the necessity of turbinectomy, with the probable sequence of improper warming of inspired air and even atrophic rhinitis.

Expansion of the arch, moreover, will, owing to the correction of the deformity which causes malformation of the septum, prevent mal-effect upon brain development. The septum when pressed upward by the high arch will, if it does not buckle, transmit undue pressure up to the frontal lobe of the brain, which rests on the orbital plate of the frontal bone. As this part of the brain controls the development of the other parts, defective mentality may directly result.

As to the technique employed, all the cases under discussion unquestionably involve expansion of the arch, so it is not a question of what to do, but of how to do it. Personally I am still a little conservative in opening the maxillary suture, although it is practiced by many prominent orthodontists. In the very cases where it is used most often, *i.e.* in the very young, we can gain our most satisfactory results in the expansion of the arch, including more nearly bodily movement of the teeth and alveolar process.

The subject under discussion is a broad one; when we know the interdependence and close relationship of all the tissues of the face and cranium, we realize better the importance of any corrective measure here employed. Changes brought about by treatment in our field show actual or reflex influence and improvement of associated tissues, no matter how apparently remote. Conversely, the importance of arresting the progress of any abnormality is also shown. So many forces work together in the dental and nasal apparatus, making for efficiency, harmony, and beauty in action, that interference with any of these forces, be it during the years of development or later, must tend to result in serious injury, if not involving destructive sequelæ.

Let us therefore realize our responsibilities in the great field of prevention, by the education of parents and patients, as well as by the diagnosis and eradication of abnormalities in any of the links of that great chain which, by perfect co-ordination, makes for normal, healthy mankind.

Dr. ABRAM HOFFMAN, Buffalo. The essayist's paper is such that if it were presented before a body of rhinologists or orthodontists, it would bring out a great deal of very interesting and helpful discussion, and as it is, it contains a great deal of interest to dentists in general. The beautiful slides shown, demonstrating the expansion of the arch and the opening of the maxillary suture, represent the most advanced thought and practice of the orthodontist.

Expansion of the arches does not mean simply adjusting the arch appliance and allowing the patient to wear it. This appliance, when incorrectly applied, is capable of doing a great deal of damage because of its continual effect. We see and hear frequently of cases in which the anchor teeth have been tipped into buccal occlusion, perhaps over night! Thus the simple-looking expansion arch may prove a dangerous appliance in the hands of the incompetent or careless operator.

Opening the maxillary suture, in my opinion, is good practice. I am not practicing it, however, as extensively as are some orthodontists. By way of caution, we must avoid producing the broad flattened arch, with the anterior teeth set virtually transversely across the arch, as in the brachycephalic type, in a face which nature intended for a long and narrow arch, as in the dolichocephalic type. If we are to expand an arch we must have a clear conception of what is needed in that individual case in regard to size, shape, etc., in accord with the temperamental type of the individual.

Dr. H. A. Ketcham, in a paper published in the DENTAL COSMOS for September 1910, at page 959, very graphically illustrates the amount of expansion which can take place in a child of suitable age. He shows three models of an upper arch, the first model representing the case when treatment was started, the second when treatment was finished, the third several years later. In the next column these three models are shown reversed, the rhinologist having sketched upon them the relative sizes of the nasal chamber during the course of development. It is marvelous to note how in eight months the nasal chamber was expanded from about one-half normal size to about seventh-eighths normal size, and how a couple of years later, when the child was again examined, the nasal chamber had developed to normal measurements.

Dr. N. S. Hoff, Ann Arbor, Mich. The essayist's paper certainly demonstrates the importance of the work which he has accomplished.

I have my doubts as to the advisability of generally applying an operation of this sort for what you have pleased to call separation of the arch. Personally, I think that the separating of the arch is an expedient to be used only in cases where is it clearly indicated, as you would use a surgical procedure in a case where such surgery is demanded for the sake of relief. I mean by this statement that a distinction should be made between what I call development of the arch and the simple spreading of the arch. In orthodontic procedures I believe in the gradual and constant development of the arch rather than in using a sudden and forceful means of expansion in a certain direction only, resulting in developing a part rather than developing the entire process to the typically normal. I should call this method a surgical procedure to be followed for the accomplishment of a particular object.

I am not sure that it has not been demonstrated clearly enough to us that permanent injury may be the result of such forceful and rapid opening of the maxillary suture. We are not certain that bone development will ever close that suture in a normal way; we shall need to have more data in regard to this point. In the operation of surgical closure of the bone cleft in cleft palate, it has never yet been demonstrated conclusively that the bone was re-developed, although it is believed that in surgical operations made to close the soft tissues bone will develop within to support these soft tissues. I question whether we are warranted in doing these rapid operations without assurance of a complete normal re-development of the bone in that position, or whether we are justified in making this operation except as an expedient, as in a surgical operation.

My idea of orthodontic force exerted in the various forms of appliances is that it should be applied in that gradual manner which will bring about normal development, and we shall not get this development in the suture unless we secure complete re-development throughout the entire bone. We know that interstitial development of the bone takes place, causing a full development and contour in such cases, of which beautiful pictures before and after treatment have been exhibited on the screen. We should not merely spread the arches and fill the space with soft tissue, etc., but bring about a building-up of the bones. By normal gradual pressure interstitial as well as superficial bone development is produced, which is ideal and according to nature and physiological in development; it is not only beautiful, but permanent and harmonious. For that reason I am inclined to favor the safer and more conservative method of gradual expansion. We may separate the arches in those cases where we need to relieve a stricture or closure of the nasal cavities by a surgical operation, as the rhinologist cuts out the turbinated bones or performs an operation on the septum. I would separate the arches forcefully in this manner only to procure such space; but, if we could have patients early enough to do this by a gradual developmental process of the whole arch, including the facial bones, it seems to me we should accomplish our object, not so rapidly perhaps, but more definitely and physiologically.

Dr. A. D. Black, Chicago, Ill. It should be made clear that an operation of this kind is not what we ordinarily understand by an operation in orthodontia; it is not an operation which should be done for the correction of irregularities of the teeth alone, but primarily for the relief of constricted nasal passages. If this view is correct, this operation should not be undertaken except by the orthodontist and the rhinologist jointly. Such an operation should not be performed as a purely orthodontic procedure, because the arch may be widened by ordinary means without the separation of the central incisors. In a good many cases the superior labial frenum is attached deeply between the central incisors, causing the separation of these teeth and necessitating the deep removal of this tissue in order to bring the teeth together and to hold them so. I am doubtful whether or not separation of the maxillary bones might, as a result of tissues formed between the central incisors, produce some difficulty in holding them together in after-life.

There is no doubt in my opinion that the nasal passages are enlarged by the separation of the suture, and the operation is justified in those cases in which both the dental arch and the nasal passages need to be widened.

Dr. J. W. **Beach**, Buffalo. I feel that this is one of the most important papers on orthodontia and on the comparatively new phase which it has taken on recently.

As a regular worker in the ranks, I would fully agree in my views with Dr. Hoff and Dr. Black. I believe this new operation should be considered and undertaken with extreme care, and only when there is some definite object in view.

The development of the internal and external face involves the remotest part of the body; its influence is far-reaching, and in the great question of prophylaxis and preventive measures agitating the profession it plays a most important part.

Dr. L. M. **Waugh**, Buffalo. In my opinion it is excellent for the general practitioner in dentistry to hear of what orthodontia offers. As a profession we seem to be lacking in knowledge of the possibilities of orthodontia, and many times our patients come to harm because we do not realize the benefits which might be derived from orthodontic treatment.

I feel incompetent to express an opinion on the relative merits of separating the sutures and widening the arches. I know that Dr. Pullen proceeds very cautiously, and is making a careful study of this procedure, which he does not intend should be practiced promiscuously, but which may be of great benefit in many cases. I have noticed, in patients whom I referred to the orthodontist, the greatest development and improvement of the face and of general health as the result of opening the nasal passages and securing a freer breathing-space. As a general practitioner of dentistry I wish we might have more papers which would teach the benefits of orthodontia and impress upon the profession that orthodontia means not only the alignment of the teeth, but bringing them in contact so that they can be more easily cleansed and will be less liable to caries. Orthodontic treatment is not simply a matter of improving the facial appearance, but a matter of health, and the general practitioner, if he does not know positively whether the teeth of a patient are in normal occlusion without any irregularities, should refer him to an orthodontist for final judgment. Many patients are not receiving the benefits of orthodontia because, as general practitioners, we do not fully understand the real meaning and scope of this specialty.

Dr. **Pullen** (closing the discussion). I heartily appreciate the extensive discussion that has been accorded to my paper. That portion which relates to the opening of the maxillary suture has been discussed more fully than the first part, which dealt with the expansion of the arch. This is only natural, since the operation of opening the suture is somewhat of a radical departure from the usual methods of arch expansion, and the indications for this radical operation are not thoroughly understood.

There is no doubt that this is an opportune time for the discussion of the manner and advisability of performing the operation of opening the suture, but it is doubtful if our present conclusions, owing to the lack of statistics covering the results in a large number of cases, can be regarded as definite. The possibilities of beneficial results to be derived from this operation, as evidenced by a number of cases in which it has been applied by conservative investigators, are great enough to warrant its being given special prominence and favorable consideration at least.

Dr. Sager mentioned the possibility, in opening the suture, of the lower arch being smaller, or rather of the upper arch being developed beyond the position of the lower arch. It will be noted that in the cases shown the upper arches were in lingual occlusion, so that the opening of the suture and widening of the upper arch did not expand the upper arch laterally much, if any, beyond the normal position of occlusion. In other words, the cases were selected for their peculiar fitness for this operation.

The opening of the suture is an operation which should by no means be performed in every case that presents, but only in cases where it is indicated, and then only by men competent to perform it in a careful and conservative manner. It is not to be expected that the specialist will make the mistake of attempting to make a brachycephalic face out of a dolichocephalic one, and I do not believe Dr. Hoffman would fear for the results if a case were in the hands of an experienced specialist.

In reference to Dr. Hoff's remark, I can only conjecture as to the amount and quality of bone that might form after the suture has been opened.

I agree with Dr. Black that the opening of the suture is an operation which should be performed by the orthodontist and the rhinologist jointly, for the field of the operation concerns the one quite as much as the other.

I anticipated considerable criticism of this suture opening, and I would append to the paper the following notes thereon, by way of explanation of the possibilities of this operation:

Opening of the maxillary suture has been observed and commented on for over fifty years. Dr. E. H. Angell of San Francisco described this phenomenon in the first volume of the DENTAL COSMOS in 1860, and since that time Farrar, Black, Goddard, G. V. I. Brown, Francis Faught, and many others have performed this operation, some by accident, some by intention. Dr. Black and Dr. Ottolengui have recommended this operation for its possible benefits to nasal breathing. Dr. Brown performs the operation for the distinct purpose of widening the nasal space and inducing greater respiratory function.

In the large number of the recorded cases of opening of the suture where observations have been made, it is notable that no harm has been done. It is absolutely painless when properly performed, and much benefit to nasal breathing has resulted. Hence this operation has passed the questionable stage, and can be recommended in certain cases as being of great immediate benefit to nasal breathing, which function, when properly established, is going to do more toward restoration of structural normality than we are perhaps inclined to credit it with.

I will concede that comparatively meager observations have been made as to the exact anatomical changes that take place in separation of the maxilla at the suture, but this is due to the difficulty attending the making of measurements. With the modern X ray at our disposal, and with the use of such measuring instruments as Dr. Wright has exhibited, as well as by rhinological examination before and after the opening of the suture, these anatomical changes will be more exactly known.

There are a number of anatomical changes, however, that could be easily accounted for after this operation; for example in many cases treated in this manner the deflection of the nasal septum has disappeared. If you examined the maxillary suture in the skull that I exhibited, you will have noticed that the vomer which forms the nasal septum extends into the maxillary suture. If the suture is really opened clear through, the vomer could drop a little farther into the suture, relieving at once a deflection of the septum, although the increase in width of the nasal space may accomplish the same result.

Again, the inferior turbinated bone is attached directly to the superior maxilla, and in this operation these bones would be separated, thus giving greater air-space and consequent increased nasal ventilation; for the same reason the whole internal face must share in the development occasioned by the lateral stress, which in this operation would be as extensive as in the operation for arch expansion.

As a matter of fact, in most of Dr. Hawley's cases the evidence of the X ray is somewhat negative as to the opening of the maxillary suture.

Dr. Hawley seems inclined to believe that what takes place is "the stretching of the thin plates of the palate between the reinforced portion along the suture and the thick alveolar structure surrounding the teeth." "Practically all the radiographs of the palate show this portion to be thin, and the radiographs taken after treatment give evidence of the stretching and rearrangement of the bone in that region." "That this line is the line of least resistance is indicated by the fact that cleft palate appears along this portion of the palate."

Regardless of whether the suture is actually opened or whether there is a stretching of the thin plates of the palate in this operation, the facts upon which it is considered advisable in certain cases are these:

First, the result is accomplished in two or three weeks' time, as against a period of perhaps a year's time or longer in expanding the arch for the definite purpose of increasing the nasal space; and second, more immediate benefit is derived from increasing nasal breathing where it is eminently desirable.

After all, it is a question of what will secure the greatest benefit to the patient, and if a case presents at an early age, between four-and-a-half and ten years, with the worst symptoms of nasal constriction, mouth-breathing, muffled tone of voice, impaired constitution, shortness in stature, under-weight, and anemia, it is of vital importance to the patient that we perform that operation which will do the greatest good physically.

Some cases are so bad that all the arch expansion that can be induced cannot cure or apparently remedy, while possibly the long period of treatment may allow further retrogressive changes in the membranes of the nasal sinuses to take place before the development of the nasal sinuses is secured. In these cases it would seem that the immediate widening of the nasal spaces in a few weeks by opening the suture would give nature the best opportunity, through immediate restoration of nasal function, and assist in more quickly bringing about the proper oxygenation of all of the bodily tissues through increased respiratory ability, and thus in laying the foundation for the increase in other bodily functions and the consequent restoration to health of the child, who might be doomed to suffer untold misery if these aggravated conditions were not relieved.

The meeting then adjourned until the evening session.

(To be continued.)

NORTHEASTERN DENTAL ASSOCIATION.

Seventeenth Annual Convention, held at Portland, Me., October 26, 27, and 28, 1911.

(Continued from page 475.)

FRIDAY—*Morning Session.*

The meeting was called to order on Friday morning, October 27th, at 10 A.M., by the president, Dr. Kelley.

Owing to the illness of the secretary, Dr. Kinsman, the assistant secretary, Dr. C. F. Kreppel, acted as secretary during the entire day and evening of Tuesday.

The first order of business for the morning session was the reading of a paper by Dr. H. J. Goslee, Chicago, Ill., entitled "The Extent to Which the Casting Process May be Advantageously Applied to Crown and Bridge Work."

[This paper is printed in full at page 575 of the present issue of the COSMOS.]

Discussion.

Dr. F. W. ALLEN, Boston, Mass. I have listened with a great deal of pleasure to the paper, and it seems to me to be most complete in all its details. In my own work, in getting adaptation, etc., I have encountered some difficulties that the essayist has apparently eliminated.

I have tried casting to the base of these crowns, but have ceased doing so because of the danger of fracturing the porcelain; also because I did not obtain as accurate a fit as by burnishing metal to the porcelain as he suggests, which I find makes a very strong base. This work requires the closest attention to minute details throughout, and unless you have a laboratory man more competent than yourself, it is well worth while to carry out these details personally.

The essayist has told us that cast crown and bridge work is stronger than soldered. I am glad to know this, because I would much rather cast than solder. I should like to know what percentage of platinum the essayist uses in backing the crowns. I would also ask to what extent the loss of the pulp affects the strength of the teeth in bridge work, or rather to what extent the loss of the pulp should be considered as affecting the strength of the abutments.

Dr. L. L. BEACH, Bristol, Conn. I should like to ask Dr. Goslee if he can give us a general rule as to when to use fixed and when removable bridges.

Dr. W. S. PAYSON. I would like to ask if Dr. Goslee uses anything but platino-iridium for posts.

A MEMBER. He speaks of coin gold being used, and I would like to ask whether he refers to gold of recent coinage or the coinage of years ago.

Dr. PARKHURST. I would like to ask whether he considers one method of casting superior to another.

Dr. BOWER. I would like to ask whether he uses platino-iridium or clasp gold wire in casting.

Dr. N. A. STANLEY, New Bedford, Mass. There is no doubt at all in my mind that the occlusal surfaces of all-porcelain teeth are far superior to any casting or backing that we can use. I have adopted the method of casting the base, and have obtained such perfect results that I have given up swaging a cap over the teeth. In this way the extra work of burnishing or swaging to the teeth is eliminated. I should like to have the essayist explain a little more in detail why it is necessary to swage a thin band of gold to the tooth. I supposed that casting had become so accurate that we might eliminate that. I agree with his idea of the saddle structure of bridges. I have always made them to rest, without causing pressure, on the soft tissues, and they are self-cleansing.

Dr. GOSLEE (closing the discussion). One gentleman said he would like to have me tell why cast work is stronger than soldered work. I have two reasons for this statement. In the first place, there is nothing more brittle than soldered work, and in the second place, we have in cast work a more uniform degree of strength throughout. Solder will fuse and run to the point of greatest heat; it is therefore almost impossible to secure a uniform thickness; this is easily obtained in casting. Cast gold which has not been rendered brittle by previous casting produces a stronger structure than soldered gold. All alloys of gold used for casting must, however, be clean, and should be of a good grade and thoroughly melted. I never recommend the use of pure gold as a solder. Some operators are recommending the casting of all parts of crown and bridge work with a five per cent. alloy of platinum in pure gold. If such an alloy is used, the fusing-point is increased beyond that of pure gold, and the latter can then be used as a solder in the assemblage of all the parts. I am, however, not prepared to say that such joints are as strong as those made with 22-karat solder.

One gentleman asked as to the advisability of interfering with a vital pulp in the application of bridge work. I have always felt that the degree of strength required in the attachment between the bridge and the natural tooth or teeth must be obtained at any expense, and when it is impossible to obtain this without devitalization of the pulp, I never hesitate to devitalize. In the bridge that I exhibited, where inlays were used as the abutment pieces, I indicated the removal of the pulp in the bicuspid, while in the molar the pulp was not disturbed. It would scarcely be possible to adapt an inlay anchorage in any of the ten anterior teeth, and obtain adequate anchorage sufficient to carry a fixed bridge, such as I have shown, without devitalizing the pulp. This, however, is sometimes possible in molars. I can perhaps best answer the question by saying that, whenever the strength of an attachment made to a vital tooth is at all doubtful, it is best to devitalize the pulp and obtain the maximum of strength, because then the possibility of subsequent death of the pulp from the extensive cutting which may be necessary in the adaptation of the inlay is eliminated.

One gentleman asked me to give some general rule as to when fixed and when removable bridge work is indicated. I first thought that I could state such a rule, but the more I think over it the less easy it seems, although generally fixed bridge work is indicated wherever the position and stability of the teeth permit them to be used as supports or anchorages. The abutment teeth must not be too far apart, in order that the number of teeth to be supplied between these abutments may not be too great. By stability I mean that the surrounding conditions of the abutment teeth must be favorable to health and strength. These requirements, then, would limit the application of fixed bridges to cases where not too many teeth are missing, or where a sufficient number of supporting teeth are left to insure strength in the fixture.

It is rarely advisable to subject one natural tooth to more work than that performed by two teeth. The two canines are exceptions to this rule, however, for they may often be expected to carry the four incisors, and thus do the work of six teeth. In all cases we must rely, first, upon the stability of the supporting teeth, and wherever their position and stability is not favorable, a removable structure is indicated. When I feel that I have enough solid teeth to carry a fixed bridge, I use them without considering a removable structure at all; but when I am in doubt as to their favorable position and strength, I use a removable structure. The decision is largely a question of judgment and mechanical instinct, after all.

I have been asked whether I always use iridio-platinum posts in cast work. I formerly did, but since this alloy is so expensive, I have used S. S. White clasp metal, and I believe that it answers all the requirements.

I was asked if I regarded any one method of casting as being better than any other. I cannot answer that question, because I have used but one method. I think the choice is very largely a question of technique. If Dr. Parkhurst means by "method" any special machine and its application, I believe that one can obtain more or less successful results with almost any of the machines now in use; but success lies more largely with the operator than with the method or machine employed. I believe, however, that it is possible to obtain the best results only with the best instruments at our command, and that good results with inferior instruments or slipshod methods are but an accident.

One gentleman asked why I thought it necessary to use pure gold swaged or burnished to the porcelain teeth, instead of molding wax to them. I employ this method in dummy work for the reason explained in my paper. I have never been able to mold wax to the surface of a porcelain tooth, invest and cast it, and get the casting to embrace the porcelain tooth with the same certainty and accuracy as when thin gold is first burnished or swaged to fit this surface, and the casting is then made thereto. When more than one tooth is used in an appliance, a change of form such as may result from shrinkage or warpage is overcome by the presence of pure gold backings.

Dr. Allen. The question came up as to the use of two fixed inlays. I should like to ask Dr. Goslee if he does not think it better to have a lug running into a filling as one abutment, in preference to having two fixed inlays. Assuming that a bridge is to be made from a bicuspid to a molar, for instance, would it not be better to have a lug run into the bicuspid?

In casting, the heat of the metal must be intense; the metal must be in a fluid condition. I have seen good inlays made with the ordinary blowpipe, but am unable to do it myself. I raise the metal to a very high heat, but sometimes have burnt out the posts. I have used clasp metal posts, as suggested, but they burn out, on account of there being too much heat. I think it would be well to define at least the alloy that the essayist uses in making the posts and in connecting the parts.

Dr. Goslee. The use of lugs resting in fillings instead of having two fixed inlays is very excellent when one or two teeth are to be supplied, and no more. When one anchorage is secure, a lug on the other end, resting in but not being a part of the filling is often advantageous, because some slight mobility is secured, which is natural, and equal resistance against stress in the other directions is afforded.

There seems to be no standard formula for clasp metal. Each manufacturer makes his own alloy according to his own formula, and some of these alloys will scarcely stand the heat of 20-karat solder. Naturally such an alloy cannot be expected to withstand the casting of 22-karat gold to or upon it. The operator therefore must select a clasp metal alloy that will withstand the necessary heat, and the S. S. White, I think, will do it.

Dr. Allen. I have fused Whites'.

Dr. Goslee. Then you had your gold overheated or cast in a hot flask. Casting in a hot mold, in my opinion, is one of the greatest mistakes made in casting, as the mold is expanded far beyond normal in proportion as it is heated. It is necessary, of course, to heat the mold to such a degree that the wax and all by-products will be burnt out, but when that is done, it is not necessary to heat the mold to a higher temperature. In experimental tests the best results have been obtained by casting into a mold that was only warm, or as nearly normal as possible.

Dr. Allen. I should like to ask if you heat the mold any more in casting against clasp metal than in casting an ordinary inlay.

Dr. Goslee. No.

Dr. OTTOLENGUI. I want to say just a word in elaboration of one of Dr. Goslee's remarks. The idea of casting in a cold mold was suggested to me many times before I understood it, and now that I do understand it, I may help someone else by making it clear.

The mold must not be ice-cold when molten gold is forced into it, especially if the gold is melted in a crucible which is a part of the mold. It has been thought by many, especially where there are pick-ups to be taken care of, that it is necessary to play upon the mold with the flame before melting the gold. That is possibly the extreme, and is wrong, because, as Dr. Goslee explained, such excessive heat is not necessary in the case of pick-ups, because the piece will always be picked up even though it be iridio-platinum. If I had any doubt about such a pick-up, I would simply melt a high grade of solder upon the iridio-platinum before placing it in the wax pattern. Molten gold would be sure to melt this solder, and thus make a firm union. I have never had any difficulty in picking up, even without such precaution, and it can be done as well in a cold mold as in a hot one. That brings me back to the cool mold, which merely means one that is being kept as cool as possible while casting. That means that the operator must have a flame large and hot enough to melt the gold in the crucible. This flame will necessarily heat the mold to a certain extent, but it is also true that an excess of flame does not melt the gold any more quickly than a flame just sufficiently large, though it heats the mold very quickly. Consequently it is advisable to use little illuminating gas, and just enough nitrous oxid mixed with it to produce a high heat, only a very small flame coming from the blowpipe.

Dr. KELLEY next read to the society a letter from Dr. Flanagan announcing the death of Dr. C. T. Stockwell of Springfield, Mass., and suggested that during the afternoon session the society pause for a few moments and give their thought to Dr. Stockwell.

Motion was then made and carried to adjourn until the afternoon session.

FRIDAY—*Afternoon Session.*

The meeting was called to order Friday afternoon, October 27th, at 2.30 P.M. by the second vice-president, Dr. A. J. Sawyer.

The first order of business for the afternoon session was a lecture by Dr. S. H. GUILFORD, Philadelphia, Pa., entitled, "Operative Dentistry: Past, Present, and Future."

Dr. KELLEY. The time has now arrived when the funeral of Dr. Stockwell is to take place in Springfield. Dr. Stockwell was one of the honorary members of this society, and I would ask the association to remain in silence for a moment, in order that we may take some part in the funeral services of Dr. Stockwell.

Dr. KELLEY. The next order of business for the afternoon will be a talk by Dr. THOMAS E. WEEKS of Philadelphia, upon "The Technique and Science of Making Gold Inlays."

Dr. Weeks then addressed the society on that subject.

The President then announced that the time had come for the business meeting of the association, and called upon the editor for his report.

Dr. L. L. BEACH, Bristol, Conn., editor, presented as his report the fact that Dr. Anthony was present and making the report of the meeting.

The report was on motion received.

ELECTION OF OFFICERS.

Dr. BOARDMAN, chairman of the Nominating Committee, presented the following report:

President—Dr. A. J. Sawyer, Manchester, N. H.

First Vice-president—Dr. F. T. Murlless, Jr., Hartford, Conn.

Second Vice-president—Dr. C. E. Parkhurst, Somerville, Mass.

Secretary—Dr. E. O. Kinsman, Cambridge, Mass.

Assistant Secretary—Dr. C. F. Kreppel, Forest Hills, Mass.

Treasurer—Dr. David Manson, Burlington, Vt.

Librarian—Dr. J. H. Worthen, Concord, N. H.

Editor—Dr. L. L. Beach, Bristol, Conn.

Dr. D. W. JOHNSTON moved that the report of the committee be accepted. (Motion carried.)

Dr. BOARDMAN moved that the rules be suspended and that the assistant secretary be empowered to cast one ballot for the list of nominations.

The motion was carried; the assistant secretary, Dr. Kreppel, cast the ballot, and the list of nominees were duly declared elected as the officers for the ensuing year.

The President then read a letter from Dr. G. A. Maxfield, expressing his regrets at not being able to attend the meeting on account of the fact that the Massachusetts State Board was holding its examinations at this time.

The next order of business was the discussion of the subject of the reorganization of the National Dental Association.

Dr. E. S. GAYLORD, New Haven, Conn., and Dr. R. OTTOLENGUI, New York, discussed the attitude that the Northeastern Dental Association should assume toward the reorganized National Dental Association, and Dr. Ottolengui outlined in detail the object of reorganization and the benefits that it would entail for the profession at large.

Dr. Gaylord then presented the following resolution:

RESOLVED, That the Northeastern Dental Association heartily indorses the intention of the National Dental Association to reorganize along the lines of the American Medical Association; and be it further

RESOLVED, That if it meets with the approval of the National Association and the state societies of New England, the Northeastern Association would be glad to come in as the Northeastern Branch of the National Dental Association.

The resolution was seconded and adopted by the association.

The meeting then adjourned until 8 o'clock P.M.

FRIDAY—*Evening Session.*

The meeting was called to order Friday evening, October 27th, at 8 P.M., by the president, Dr. Kelley.

The first order of business for the evening session was the reading of a paper by Dr. M. L. RHEIN, New York, N. Y., entitled "Oral Sepsis."

[This paper is printed in full at page 529 of the present issue of the COSMOS.]

Discussion.

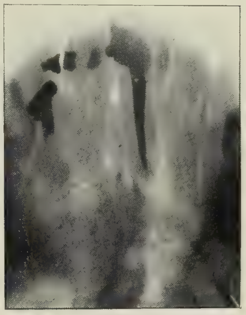
Dr. N. A. STANLEY, New Bedford, Mass. I would request Dr. Rhein to tell us just how he succeeded in getting to the end of the mesial root of that molar that had such a beautiful curve. He says that it took him ten hours to do so, but perhaps he can tell us in a few minutes how he did it. In addition to potassium and sodium, what instruments were used?

Dr. R. OTTOLENGUI, New York. I wish to emphasize one thing that Dr. Rhein has said: Dr. Hunter clearly admitted that he is acquainted with really good dentistry and many good dentists; he claimed further that many evils occur in the human body on account of bad dentistry, and I say with Dr. Rhein that we should be grateful to him rather than ungrateful. If these conditions are facts known to physicians, and we ignore them, it is time that they should be brought to our attention.

Here is the history of a case which illustrates my idea of average dentistry. A patient of mine, a woman, married some two or three years ago, retaining me as her dentist, while her husband remained loyal to his dentist, who died some time afterward. This gentleman suddenly developed an abscess in the region of the upper central incisors, had a swollen lip and gum, and suffered a great deal of pain. The pain increased during the day, and he went to a dentist near his place of business. The dentist made an examination of the teeth, noticed an abscess on the upper central incisor, and lanced it, which afforded momentary relief, but the patient suffered with it that night. The next day he returned to the dentist, who on finding that the inflamed area extended over to the other central incisor, lanced that also; then, thinking that there must be some trouble in the roots, he partly removed a gold filling from one of the central incisors, and then started to remove a "dead pulp" from it, but was deterred by finding that *the pulp was not dead.* Consider the diagnosis which that dentist made! Because of the swelling occurring over-night, over the central incisor, he diagnosed an abscess in that root produced by a dead pulp—of course, the pulp must be dead! yet he drilled in and found it vital. Then he tried the next tooth, drilled out a gold filling on the lingual side, eventually made a vent and obtained a flow of pus from that tooth, but even that did not relieve the patient. The next day his wife brought him to me, because I was her dentist—and that, of course, is the kind of loyalty we all expect. I removed pieces of cotton from each of the cavities which had been made in the lingual surfaces of the teeth, and found that one of the teeth was vital. From the other I withdrew a piece of cotton lying loosely in the lingual opening, then removed a cotton dressing, whereupon a free flow of pus occurred. I then introduced a sterile broach into the apparent canal, and it went in so freely that my conception of conditions suffered a shock. I could not believe that the dentist had so thoroughly removed the gutta-percha root-filling, giving such free vent through the end of the root, while the tooth was so sore. I then removed the rubber dam. and placing my finger over the soft parts, I found that *I could feel the end of the broach,* which convinced me that the dentist had drilled through the labial root-surface of the tooth. I allowed the tooth to evacuate itself and get thoroughly dry, and then saw what looked like a perfectly good root-filling some little distance from this false canal which had been drilled.

Now, I wish to point out a little clinical fact, from which I made a deduction, which this other dentist evidently had entirely overlooked. In examining the lingual surface of the abscessed tooth, I found that the first dentist had extended the cavity almost to the incisal edge of the incisor. From this I concluded that the operator who had made that extension of the cavity had done so in order to obtain direct access, or what Dr. Rhein calls geometrical access to the canal, and from that I concluded that that operator knew his business, and that we would probably find that he had properly filled that root. As I found a tooth with an abscess, with a false opening at the side, but with an apparently good root-filling, it seemed to me that the reasonable procedure was to obtain a radiograph before doing anything else. (See Fig. 1.) You will observe that the root had been well filled originally. This case was cured by apicoectomy and curetment.

FIG. 1.



I will now show another case of a single-rooted tooth, and give you my idea of the importance of knowing the clinical history of a case in order to make a correct diagnosis from a radiograph. This patient was an exceedingly intelligent person, and when he saw the first radiograph (Fig. 2), he wanted to know if he had an abscess over each tooth, because in the radiograph he noticed the similarity of the two light areas. I explained to him that in one case the light area was due to a lack of density in the bone, and in the other to an active abscess. I knew this because I had treated an abscess over the centrals some three years ago, and had myself filled the root. After filling the root of the lateral, he conceived the idea of having another radiograph made in order to see what the area around the root would look like after it was filled. The radiographer, Dr. Schamberg, called me up later and told me that he was much embarrassed. He said that the patient understood so much about his case that he was doubtful about showing him the picture, because from his experience roots are so often only partly filled. He said that he would be obliged to show the patient the radiograph, but he hated to think that he might show up my poor root-filling. Fig. 3 is the radiograph in question.

Fig. 2.

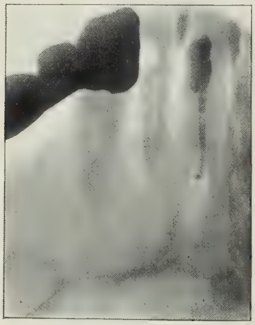
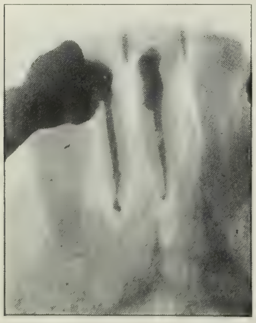


Fig. 3.



I wish to say that if there is any credit due me for this class of work, it is but a natural reflection from Dr. Rhein. I have known and believed that Dr. Rhein reached the end of root-canals many years before the profession began to believe that he did, and by adopting his technique and methods I have been able to treat all sorts of root-canals successfully.

The Schreier paste, in my mind, is absolutely necessary in this work, yet, although it has been advocated so often there is so small a demand for it in this country that it is difficult to obtain. It took me thirty days, after I came home this summer, to secure a new tube, and I had to send to Europe for it. Dental depots do not have enough demand for this agent to keep it.

The point I wish to make is that you have no right to say that Dr. Rhein exaggerates or that he cannot reach the end of the roots, unless you have tried this material and this technique; and the evidence that you do not try it is found in the small demand for sodium-potassium in this country. I am not surprised that we see so many radiographs of roots half-filled and one-third filled. Correct root-filling requires a delicate technique even with sodium and potassium, but without it I do not think it possible.

Dr. T. E. Weeks, Philadelphia. How many pounds of sodium and potassium would that gentleman have had to use to avoid perforating the root labially? The real reason why he perforated it was because, in the first place, he did not know his dental anatomy, and in the second place, our drill will bore a hole anywhere. We start it, but do not start it right. Draw your own moral—he did not make a geometrical entrance to that canal.

Dr. C. E. Parkhurst, Somerville, Mass. I would like to ask whether the previous use of any drug in treatment, such as sulfuric acid, would in any way annul the action of sodium and potassium. Also, whether capillary attraction will carry this preparation to the desired spot in an upper as well as in a lower tooth.

Dr. A. J. **Sawyer**, Manchester, N. H. I have been very much interested in Dr. Rhein's paper, which has convincingly demonstrated the great value of the radiograph in treating these cases, but there is one criticism that I would offer, namely, in regard to the use of such powerful agents in cleansing root-canals and destroying the germs of putrefaction as sodium and potassium, formaldehyd, zinc electrolysis, etc. It is like loading your gun as for a moose, when you are going to shoot a sparrow; the result is accomplished, but unnecessary chances are taken.

I used the sodium and potassium treatment when it was first brought out some years ago, and found that it frequently caused severe pain and discomfort, and that soreness of the teeth followed its use. I also found that it was not as efficient in dry canals as some other remedies, and that in wet canals it developed such intense heat that the broaches were either burned off or tempered so hard that they were apt to break off in the canals. The violent action of this drug, moreover, always necessitates the use of the rubber dam. For these reasons I discontinued its use, believing that we have other remedies which are non-irritating and anesthetic, and with which we can thoroughly cleanse and disinfect the root-canals without causing any unnecessary suffering to the patient.

Why is it that the sodium and potassium treatment, which "caused such a sensation among the leading dentists of the country when it was brought out in 1893," should have been so largely abandoned by those eminent men? I believe it is because we have other remedies which are efficient and which do not possess the objectionable qualities of potassium and sodium.

For the enlargement of very small canals and the removal of pulp-stones or nodules, I have found that a 40 per cent. solution of sulfuric acid and a very fine smooth broach is far more efficient than sodium and potassium, but I use the acid only in canals which I am unable to open and enlarge otherwise. Unless acute inflammation is present, the time for filling a root-canal is when it has been opened and thoroughly cleansed, regardless of whether that be at the end of the first or at a subsequent sitting. Thorough opening, thorough cleansing and thorough sealing are all that can be done, unless root amputation is indicated.

Dr. C. C. **Patten**, Boston, Mass. This paper has appeared at a very opportune time for me, as I came down here disturbed over the condition of a patient who consulted me only a few days ago, with a condition of septic poisoning. The trouble was in the region of the upper bicuspids. The first bicuspid held a porcelain crown, the second a gold cap. There was a fistulous opening leading from the gingival margin of the second bicuspid anteriorly to the apex of the first bicuspid. The patient gave a history of severe pain, which dated back to the middle of the summer. Before instituting any treatment, however, I had a radiograph taken, which I have brought with me. It shows very clearly the results of improper root treatment. I would like to have Dr. Rhein look at it and pass it around.

Dr. F. W. **Allen**, Boston. I disagree with the remark of Dr. Sawyer that it is not necessary to use sodium and potassium, since the root-ends can be reached without it, because I do not think that this is quite true of all of us. I am convinced that it is only through kind providence and a healthy condition of the body that many of these roots take care of themselves. If a tooth becomes abscessed and we cannot take care of it, we often use the forceps. The general impression seems to be that only one dentist in a hundred cares enough to take the trouble to produce the result which the patient is really entitled to. I am inclined to think that the profession as a whole is too lax in the treatment of abscessed teeth.

Dr. A. C. **Fones**, Bridgeport, Ct. The chief criticism of the essayist's paper has been directed against the use of sodium and potassium as a germicide. The use of sodium and potassium of course is not intended for that purpose solely, by any means. The diseases of the teeth are caused chiefly by the products of dead animal and vegetable matter, decomposed by the action of germ life. The use of sodium and potassium in the root-canals is intended to absolutely destroy all dead animal tissue, *i.e.* the remnants of the dead pulp, and this drug is the only one, apparently, that will do this perfectly.

The same principle that Dr. Rhein preaches concerning root-canals holds good in the practice of prophylaxis in reference to the surfaces of teeth. The teeth must be kept in a smooth, polished condition so that all food particles may be thoroughly removed by the patient. The dentist who does not teach his patients the necessity of a clean, sanitary mouth is behind the times.

I am glad that Dr. Hunter came out as he did in the *Lancet.* If the dentists will not listen to the gospel of clean mouths and prophylaxis, and practice it, it is time that the public should know of the dangers of oral sepsis, even if it has to be taught by a public criticism from the medical profession. Criticism does no harm if it is deserved. If it is the truth, we welcome it; if we are doing something we ought not to do, let us know about it.

As a profession we cannot teach oral hygiene to the public until we practice it ourselves. What is the use of the oral hygiene movement in the public schools and among the public generally, when a large number of the dentists are open to a just criticism of such septic conditions as have been described by Dr. Hunter. The evils caused by abscessed roots, so beautifully shown tonight by Dr. Rhein, are not all. Think of the ill-fitting shell and banded crowns with a shoulder or shelf at the gum line to hold the food débris, of alloy fillings that are left rough and unfinished at the cervix, of approximal fillings with no contact points so that the food crowds between the teeth, and of many dentures covered with tartar! Every dentist should be an educational center around which from three to five hundred people revolve.

If the dentists appreciate oral sepsis and will preach and practice antisepsis, the real oral hygiene movement will be under way. I fully appreciate every word that has been spoken by the essayist tonight, and have no adverse criticism whatever to offer.

Dr. C. F. Bliven, Worcester, Mass. We have all viewed these scientifically and beautifully made gold crowns this evening, and what they have covered. It has been of great interest and instruction to all of us; that we cannot deny, but what I wish to touch on is the economical side. Dr. Rhein spoke of having spent ten hours in getting to the apex of one root.

Dr. Rhein. One tooth.

Dr. Bliven. A number of years ago, while putting a patient's mouth in order, I advised her to have a devitalized lateral incisor opened, and the root-canal properly treated and filled. She wished to know the expense. There was a small cavity which embraced perhaps a sixteenth of an inch of the mesial surface of the tooth to be filled, and I remarked that we might start with a fee of twenty-five dollars. She thought this extravagant and visited another dentist; in a few days she returned and showed me a beautiful filling in her tooth, and remarked that it only cost four dollars. I told her that she was very fortunate, and that it was a very good-looking piece of work, and I hoped she would get a great deal of satisfaction from it. Soon afterward this patient returned to me, and on examination I found an open sinus over the tooth. Later she told me that she had suffered for two weeks. She was a school teacher receiving twelve dollars a week, and had had to pay a substitute to fill her place, and in addition had been consulting a physician two or three times. This time she did not ask me what I would charge. I opened up the tooth and found the condition, which Dr. Rhein has so beautifully shown, of a canal with a lot of devitalized pulp structure at the apex. I treated the tooth to the best of my ability, and filled it, but she came back a number of times and complained of pain in that region. This was before the use of the radiograph, so I used the electric light and saw that the approximating canine was devitalized, and informed the patient that it would have to be opened and treated. The next time she presented I found the tooth very much discolored, and in need of bleaching. I finally succeeded in making the tooth comfortable, bleaching it, etc., and, I think, put these two teeth in such a condition that they will last for a great many years.

This example proves the economy of paying for a thorough piece of work in the first place, saving extra fees, abscessed conditions, and double work, with the risk, as in the above case, of losing the approximating tooth by strangulation.

Dr. E. C. BLAISDELL, Portsmouth, N. H. As far as I am familiar with Dr. Rhein's method of root-canal treatment, I think it very excellent. I used sodium and potassium for a great many years, but discarded it, probably because of the pain involved in its use, as one of the speakers has suggested. Yet in many cases I think I could improve on what has been accomplished, and am very anxious to get back to that method of treatment again.

In regard to Dr. Hunter's article, I think it has simply brought to light something that many have known for years.

Dr. J. M. MAGEE, St. John, N. B. I suppose Dr. Rhein will be glad to know that one of his disciples in root-filling is going to return to the sodium and potassium treatment.

A good many years ago I became imbued with the idea that I could fill most root-canals to the end. I was then using, and had used sodium and potassium for quite a while, but like Dr. Blaisdell, I discarded it. I intend to revert to that method of filling root-canals instead of using acid preparations.

Some years ago I made a wager in the city of Montreal with Dr. McInnis, in regard to the percentage of roots that might be filled to the apical opening. The agreement was made that the teeth be embedded in some material which would not show the ends of the roots, and I was to fill them completely to the end. Dr. Price of Cleveland, who was there at the time, was to take radiographs of the teeth to show how completely the work was done, and Dr. Ottolengui was to publish the results in the *Items of Interest*. The results were to be published also in the *Dominion Dental Journal* of Toronto. I may say that I lost my wager. I did not think at the time that the conditions were quite fair, but the radiographs showed that some of the fillings had little knobs on the upper end, like those shown on the screen, preventing those root-fillings at least from coming down again. I had also perforated two of the roots. I intend, however, to follow Dr. Rhein's method of using this preparation, even in dissolving pulpstones. We can get to the ends of roots with a small broach and sulfuric acid, but I do not like that procedure for many reasons, which it is hardly necessary to discuss in detail.

Dr. Rhein made the statement, which I have heard made many times, that the dentist cannot get a good fee for work of this kind. If we hammer away, figuratively speaking, at our patients and explain to them the necessity for this treatment, I think we can get paid quite as well for that operation as for any other. If we are going to save the teeth, I think it is quite pardonable to do anything that is necessary in order to save them. If an abscess is going to develop which will eventually cause the removal of the tooth, all our efforts are wasted. While Dr. Rhein was speaking on this point, I had in my mind the case of a young man who was working for a small salary, and with whom I spent three hours in filling the canals of a lower molar. In this case, which I treated some years ago, I charged ten dollars for the operation, and the patient was content to pay it. Only last week I saw the patient again and he still has the tooth, although he had the misfortune of breaking a large amalgam filling in that tooth. I temporarily covered the defect with gutta-percha, and expect later to insert a crown. If I had not been able to save the roots in that way, any possibility of such a restoration would be out of the question.

It is strange that one of John Bull's sons should have stirred up such a hornet's nest. I am very sure that Dr. Hunter is a man who has the courage of his convictions and should be encouraged rather than discouraged. The portion of the article that was printed in connection with the discussion which took place at McGill University convinced me that he has the greatest admiration, as Dr. Rhein has said, for American dentists, and knows that there is no place in the world where dentistry is practiced with such highly artistic results as in the United States.

Dr. RHEIN (closing the discussion). The difficulty with a presentation of this subject lies in the fact that it would require about two hours to describe the technique. I have written on this subject now for twenty years, and in that time before about thirty or forty different dental associations, and a great many men have said, Why keep harping on this subject? Why do you not give us something new, something different?

I have continued with this subject for twenty years, because of the difficulty encountered in impressing its value upon the profession. I have been content to go away from dental conventions feeling that I had gained four or five converts to the value of aseptic dentistry and what it means to the human race, and because I realized that unless you keep hammering away at the same subject and making it clear, it is impossible to accomplish anything. This object would have been accomplished years ago if the medical men of this country were taught anything about the mouth. The public at large looks to the physician for guidance, yet he knows nothing about this subject; he is as ignorant as the patient is about dentistry and the mouth. We all know that; we know that the dental quack in our own community has among his *clientèle* plenty of medical men, showing that woful lack of knowledge among men who ought to know the correct therapeutic practice in any part of the body. When the time arrives that the man who is graduated from the medical college will have been taught the principles of dental practice, you will not be allowed to continue these operations, because you will not have any patients to do them for. Physicians would not permit it for a moment, if they knew the danger of the consequent septic results. We do a great many wrong things in the world because we are permitted to do them; our mistakes are due to a sort of indifference and lack of knowledge, and because our eyes are really not open to the great wrong done. That is the reason why I am hammering away at this subject. I have made many converts to my simple and scientific root-technique. My correspondence shows that sodium and potassium is brought into this country in large quantities by dentists who go to Europe every year, because of the difficulty of procuring it here.

The sodium and potassium compound, when first introduced in America in 1893 at Chicago, during the Columbian exposition, was the sensation of that large dental meeting, and excited more comment than anything else that took place there.

In reply to the question as to how I filled the roots of the molar to which I devoted five sittings of two hours each, I should say that it required six sittings of two hours each before that tooth was filled. On the fifth session, after ten hours' work, I felt that I had reached the end of the root-canals. This result was obtained by means of sodium and potassium working its way through the calcific matter, *i.e.* the semi-calcified root-substance, not because these roots were unduly curved. After any opening has been made in canals of this kind, it is not difficult to reach their ends by disorganizing the organic matrix which binds together the calcific matter. There has been some discussion of the way in which sulfuric acid is used, and how it destroys the calcific matter rather than the soft tissue. I have discussed this privately with Dr. Callahan of Cincinnati, who originated the sulfuric acid method of working in canals, and I found him to be an enthusiastic advocate of the use of sodium and potassium. It is not likely that he would have taken up the use of the sodium and potassium if sulfuric acid were capable of accomplishing the results so frequently claimed for it. Sulfuric acid acts on organic tissue in the following way: It cooks it, coagulates it, but does not destroy it. Dr. Sawyer is wrong in supposing that we use sodium and potassium to get antiseptic results. We do not want that kind of antiseptic results. There is no way of putting root-canals in an aseptic condition by depending on preservatives, and that is what is generally meant by antiseptic treatment. All of that sort of treatment is evanescent, faulty, and uncertain; no one knows the moment when infection will take place. Sodium and potassium render it possible to remove the only portion of the root-canal substance that is likely to be infected. In portions where calcification has worked its way in and around and through the pulp tissue in a very irregular way, leaving little particles of organic tissue here and there, there is no substance that has been shown to dentists that will destroy the organic matrix as effectively as sodium and potassium. Its affinity for organic tissue can be compared with that of a magnet for iron. Each little portion of sodium and potassium destroys a certain quantity of organic tissue; when another small quantity is introduced, it destroys again the same amount of organic tissue. When sodium and potassium is introduced in this way little by little on a fine broach, it keeps boring its way nearer and nearer to the end of the canal by reason of its destructive action on the organic matter. When there is no more organic matter this chemical activity ceases, and the sodium and potassium remains as inert in the root-canal as in its original form. The sodium and potassium disappears when it forms a union with organic matter just as thoroughly as the organic matter disappears. The beauty of the wonderful transformation is that it takes place regardless of whether the organic matter is living or dead. Sodium and potassium never causes any pain in the canal of a dead tooth. When brought into contact with living tissue, however, it causes pain similar to that caused by any escharotic. It is painful when it comes in contact with living tissue.

Suppose we have such a case as Dr. Sawyer spoke of. Should we hesitate to effect a radical cure because in doing so we are compelled to give a little pain? Is that a legitimate reason for not using this substance? Consider the case of an old chronic abscess at the end of a root with a fistulous opening, the end of the canal being wide open. The sodium and potassium is very likely to ooze into the apical space, and it first painlessly burns out the diseased tissue and then coagulates the living tissue, when the patient experiences pain. That cannot be avoided, and I am always glad to notice sensation at this point, as I then know that I have reached the boundary line of healthy tissue.

The details of this technique are described in a paper published in the DENTAL COSMOS for September 1911. Tomorrow I shall give a practical demonstration at the clinic. Let me again emphasize the fact that sodium and potassium is not used as a disinfectant, but in order to destroy all organic tissue liable to infection that is situated in the root-canal.

Dr. Ottolengui has spoken of the necessity of knowing how to read a radiograph properly. Even an expert cannot always do this. A plain abscess sac filled with pus will look precisely the same before it is treated, and after it is cured. Consequently it is absolutely impossible to make a diagnosis from the radiograph alone. The radiograph is a most valuable aid to diagnosis; it must, however, be used in conjunction with a correct history and a thorough examination of the case. In reference to what Dr. Ottolengui spoke of as the buttons at the end of a well-filled root-canal, I would say that it is far better to have an aseptic and compatible root-filling project some distance into the apical space than to have it short of the end of the canal in even a very slight degree. All dentists who fully understand the compatibility of gutta-percha with the soft tissue know that there will never be any infective trouble from forcing sterile gutta-percha into the apical space.

Sulfuric acid simply touches the surface of the hard tissue. Did any of you ever try to bore a hole through a calcified root-canal with sulfuric acid? I spent weeks trying to do so some years ago, and I think I could have spent almost a lifetime at it without success.

Dr. SAWYER. Did you spend fourteen hours?

Dr. RHEIN. I spent fifty hours at it, hoping and wondering that it was possible. Dr. Callahan recommends the use of sulfuric acid in combination with sodium bicarbonate, as the bicarbonate counteracts instantaneously the acidity, and little explosions take place as the acid and antacid come together. Dr. Callahan maintains that the force of these explosions disturb the relation in the root-canals and break up the combination existing there. He speaks of a dynamic action of this combination.

One of the gentlemen asked whether the use of sulfuric acid would interfere with the action of sodium and potassium. I do not believe that it makes any difference, in the use of the sodium and potassium, what drugs have been used in the canals. I have never found that its action was interfered with in any respect. I have never found any difference in its use in a lower or in an upper tooth, nor have I ever noticed that specific gravity had anything to do with it.

I have endeavored to introduce a reliable method by which one can determine with absolute certainty when the end of a canal is reached. I do not claim that this is the only method, but I have been very successful with it. If there are any points not understood by anyone, I have never been so busy that I was not willing to take time and try to enlighten him. Let us remember that we must leave the tissue not in a disinfected condition but in an aseptic state, if we pretend to do what we should do; and if we cannot do that, then we should extract the tooth. There is no middle ground between these two points. If the public once learns what Dr. Hunter knows and what he has been trying to teach, people will not tolerate any middle way. No fee will then be too large for saving teeth and leaving them in an aseptic state, but any fee, no matter how low, will be found too high, if the alveoli are left in the septic state so graphically described by Dr. Hunter.

The president, Dr. Kelley, then declared the meeting adjourned until Saturday morning at 9 o'clock.

SATURDAY—*Morning Session.*

The meeting was called to order on Saturday morning at 9 o'clock, by the president, Dr. Kelley.

The first order of business was the presentation of a number of additional applications for membership, and motion was made and carried that these be received in the regular way.

Motion was made and carried that a vote of thanks be extended to the essayists, the clinicians, the officers, the Local Committee of Arrangements, the hotel, and all who had contributed to the success of the meeting.

The next order of business was the installation of the newly-elected officers, after which the newly-elected president, Dr. Sawyer, declared the seventeenth annual meeting of the Northeastern Dental Association adjourned.

THE DENTAL COSMOS

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PHILADELPHIA, MAY 1912.

EDITORIAL DEPARTMENT.

THE NEW RECRUITS AND THE NEW ORDER.

THE season is at hand when by the selective process known as the final examination the annual contribution of novitiates by our dental colleges to the ranks of practitioners will in due course be made, with the attendant solemnities and formalities of the several commencement functions. Some thousands of young men will issue forth filled with high expectations of success and each armed with a certificate in the shape of a diploma assuring all whom it may concern that the holder thereof is well qualified to enter upon the practice of his profession and is adorned with a good moral character, or words to that effect.

During the past three years, covering the period of the curriculum through which this particular group of recruits have been undergoing their professional life-work, the profession upon which they are about to embark has been undergoing rapid and fundamental changes, and it may be seriously asked if they have had that training, that outlook upon professional life in its newer aspects, to a degree that will enable them, or the majority of them, to take up their work in the spirit of the advancing tendency which they must meet if they are to succeed. A survey of the records of the past decade or two will show very clearly the conflict between two characteristic modes of thought or points of view in dentistry, each representing an ideal or conception of the meaning and purpose of dentistry: One which regarded dentistry as an elevated craftsmanship, an artistic handicraft, mechanical in its ideals and ends; the other, as a department of the science and art of healing, using craftsmanship as a means to an end—the great end of health, of restoration of function and the prevention of disease. The friction of these contending conceptions filled our literature with articles discussing such topics as, Is Dentistry a Trade or a Profession? Is Dentistry a Specialty of Medicine? The Scientific and the Practical, Theory *vs.* Practice, *et cetera*—all of which represented misconceptions or at least but partial conceptions of the scope and nature of that branch of human inquiry and activity which we designate by the name of Dentistry. The limitation of the scope of the subject was indicated in these titles just as clearly as the query, Is pyorrhea alveolaris a local or a constitutional disorder? expresses the intellectual limitation of the man who asks it.

The objective character of dental practice in so far as it involves mechanical procedures is so self-evident and so striking, and withal so impressive in the excellence of its results when skilfully and intelligently carried out, that it has come to be regarded as compassing the whole range of dental activities by a large proportion of those who practice dentistry. Indeed, this attitude of mind may be said to have characterized the dental profession as a whole a generation ago, if exception be made of the few who took a broader view of their professional field and who became the advance guard of a scientific development which now demands the close attention of the entire profession. The time has passed when it can any longer be claimed with insistence that mechanical craftsmanship is the foundation of dentistry, and yet such claim was stoutly championed in many directions a decade ago. This definition of dentistry by its own practitioners produced its natural reflex in the attitude of the public, who took us at our own estimate and placed us in the same category as those who served them in other skilled crafts.

The persistent study and investigation of the vital problems underlying the need for mechanical restorative procedures at the hands of the dentist soon developed two important and fundamental truths: First, that mechanical restorations were not wholly adequate to arrest the progress of the disease to the treatment of which they were applied; and second, that in many cases mechanical restorations are capable of originating disease conditions where the restorative mechanism was wrongly applied or improperly constructed. Hence a search into the more recondite and less obvious phases of the problems of dental and oral pathological conditions and their treatment became necessary. That investigation has been proceeding with such effect that the accumulated data have changed the entire complexion of the dental curriculum; and, of still greater importance, the attitude of the dental profession toward their special field of work has been fundamentally altered. The demand is not any more for the supremacy of artistic craftsmanship, but for a dentist more broadly educated in all that pertains to the vital side of his work.

A change has come about so that teeth are no longer regarded as inanimate attachments to the human body that may be mechanically mutilated at pleasure, but as organs intimately related to the entire economy, manifesting that relation by their response in various ways to general nutritional disturbances and by the reflex effect of their local diseases upon the health of the body as a whole.

The impetus that has been given to the larger development of dentistry by reason of the general interest in oral hygiene as a factor in bodily health is without parallel in the history of our profession. That interest, however, in so far as it is an expression of the public attitude, is of far deeper import than the superficial suggestion that it means more dentistry or a better opportunity for dental practice. It means that there is a demand for more knowledge of the underlying causes of tooth decay and of dental diseases in general. It means the demand for preventive measures that will prevent—not for the mere extension of present relatively ineffectual resources, but for a real prophylaxis that will prevent dental disease by eradicating its ultimate causes. The suggestion embodied in such a demand upon the part of the public is not ideal or utopian, and it is to be met by the cultivation of more interest and enthusiasm in the kind of scientific research work that must necessarily be done before the way to such a result is made clear.

The time is past when we can as a profession longer tolerate the distinction that is so frequently and ignorantly made between the scientific and the practical. The prevention of dental caries, the cure of dental disease, is an intensely practical problem that can only be solved by the earnest and intelligent application of the precise methods of scientific investigation. And to the extent that the small army of novitiates who will shortly hang upon the walls of their new offices the certificates of their competency demonstrate their appreciation of this new factor in their professional life will they also reflect the efficiency and largemindedness of the faculties who gave them their professional baptism.

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BIBLIOGRAPHICAL.

DEVELOPMENTAL PATHOLOGY: A STUDY IN DEGENERATIVE EVOLUTION. BY EUGENE S. TALBOT, M.S., D.D.S., M.D., LL.D., Professor of Stomatology Bennett Medical College, Corresponding Member Budapest Royal Society of Physicians, etc. With 346 illustrations. Price $6.00 net, or $6.40 postpaid. Boston: The Gorham Press, 1911.

The evolutional law of the "survival of the fittest" carries with it by implication the equally important law of destruction of the unfit as its negative complement, and it is within the phenomena incident to the destruction of the unfit that Dr. Talbot's observations upon degenerate evolution find their characteristic expressions.

In various ways and upon many occasions Dr. Talbot has brought to the attention of the scientific world the importance of a scientific understanding of the phenomena in his field of special study. His contributions to the literature of the subject have been extensive both as to number and as to the field covered; particularly has he drawn the attention of the dental profession to the necessity for due recognition of the underlying laws of evolution in relation to degenerative changes in so far as these underlying principles affect the development of the tissues and organs with which the dentist is concerned.

We have heard much from Dr. Talbot regarding the importance of hereditary influences in shaping the form and function of the dental structures and of the whole organism, but notwithstanding his insistence upon the fundamental importance of this field of research, his has been a slow, tedious, and to an unfortunate degree a thankless task; but notwithstanding these factors, which to a less intrepid investigator and teacher would have meant not only profound discouragement but even discontinuance of his labors, Dr. Talbot has persisted in the presentation of his case, and in the present work once more makes his demand for its consideration.

Perhaps in none of his previous communications on the subject has he presented its importance with greater clearness or with more convincing proof. It may be taken for granted that, on various points of detail, exception will be taken to certain of his findings. On the other hand it cannot be gainsaid that the general contention made by Dr. Talbot in the present work is supported by overwhelming evidence from all departments of biologic activity, and that the author has made out a case in favor of his main thesis which is incontrovertible. No one can understandingly read the presentation which he makes without being convinced of its general scientific truthfulness, and consequently of its unquestionable importance to all scientific students of the underlying problems of pathology. In view of the very definite relation which degenerative evolution bears to a number of the most important aspects of dental and oral disease, this book should be read by every practitioner of dentistry who makes pretension to a scientific understanding of his work.

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REVIEW OF CURRENT DENTAL LITERATURE.

[*Zeitschrift fuer Zahnaerztliche Orthopaedie*, Berlin, November 1911.]

AN IMPROVEMENT OF ANGLE'S APPLIANCES. By Viggo Andresen, Copenhagen.

During mastication and by the movements of the tongue and cheeks, the expansion arch, though it be firmly fixed, often loosens the nuts. Angle tried to obviate this disadvantage by extending the tube portion of the nut into the widened head of the tube. Other orthodontists prevent the turning of the nuts by pinching them with pliers or fastening them with tin solder. A simple as well as effective method consists in filing off the tube portion of the nut and filing this end so as to form a V-shaped wedge, which is inserted into a notch in the end of the tube. For this purpose the widened portion of the tube is either removed, filled with solder, or the tube reversed in order to obtain a fairly solid surface into which to file the notch. The first measure can be carried out in the mouth with small stones.

[*British Journal of Dental Science*, London, July 15 and August 1, 1911.]

EXPERIMENTS AND OBSERVATIONS ON BREAD, WITH SPECIAL REFERENCE TO THE CAUSATION AND PREVENTION OF DENTAL CARIES. By J. Sim Wallace, M.D., L.D.S.

The cause of caries, in a general way, is, in the author's opinion, the undue lodgment of fermentable but non-detergent carbohydrates in more or less immediate contact with the teeth, and undisturbed by the free access of saliva. It may therefore be safely said that—(1) No farinaceous foodstuff in general use is less harmful to the teeth than bread when eaten with butter, and no farinaceous foodstuff is more beneficial from the point of view of oral hygiene. Especially is this the case when the bread is eaten with a goodly proportion of crust. (2) The different varieties of bread, *i.e.* white, standard, and stone-milled, make no appreciable difference in inducing dental caries, beyond the difference which the physical differences of the bread make in their effects on the teeth. That is to say, the less finely ground may be presumed at least to have the more detergent effect. Whether standard bread may be considered as being less finely ground than white, the author does not say, but his experiments tend to show that the fermentation of standard bread and white bread give identical results in this respect, both for crust and crumb. (3) The crust is always preferable to the crumb in all varieties of bread. Similarly, toasted bread of any variety is preferable to untoasted bread of any variety, in regard to causation of dental caries.

[*Le Laboratoire et le Progrès Dentaire*, Paris, January 21, 1912.]

ANCHORAGE OF GOLD INLAYS WITH DIVERGING, REMOVABLE PIVOTS. By H. Leger-Dorez.

To insure the firm retention of large gold inlays in molars, the root-canals are cleansed, sterilized, and filled with gutta-percha, a hole of about 6 mm. in depth and of the diameter of a smooth nerve broach being left in each canal. Two fine gold wires of the same diameter, slightly cone-shaped, finely polished, and oiled, are introduced into these holes and allowed to protrude above the masticating surface to be restored by the inlay. The inlay is then shaped in the cavity in wax, carved, and cooled, and with long-beaked pincers the gold pivots are withdrawn from the wax model while it is still in the cavity. The patient is requested to bite, and the wax inlay is given its final contouring. After withdrawing the wax model from the cavity, the gold pivots are reinserted in the slightly distorted holes in the wax model, withdrawn, and the wax model is invested, the holes are filled with investment material, and the inlay is cast. The finished inlay is cemented to place with finely mixed Harvard cement, and the gold pivots are introduced into the holes after having been also coated with thinly mixed cement. After the cement has hardened, the protruding ends of the gold pivots are cut off near the masticating surface of the inlay, ground flush with this surface, and the inlay surface is given a final polish.

[*American Journal of the Medical Sciences*, Philadelphia, February 1912.]

INFLUENCE OF ORAL SEPSIS ON DIGESTIVE DISORDERS. By G. M. Niles, M.D., Atlanta, Ga.

As active etiological factors in digestive disturbances, the different manifestations of oral sepsis, in the writer's opinion, have not received sufficient attention. The laryngologists, he says, have studied well the influence of disordered digestive processes upon the throat and postnasal territory, elucidating that part of the subject at length, while the ophthalmologists and aurists have attested their interest by numerous papers. The dentists, like watchmen on the towers, have continually sounded the alarm, and a few adventurous spirits have invaded the ranks of the medical profession, preaching oral prophylaxis from the housetops. After briefly reviewing the different organisms, pathogenic and otherwise, which at different times inhabit the mouth, and the findings of Sarinelli and Hugenschmidt regarding the defensive action of saliva and mucous membrane toward bacteria, or rather the comparative lack of such action, Niles goes on to say that septic products in the mouth may set up digestive disturbances by direct absorption from the buccal walls; or, when swallowed, may either act locally upon the gastric mucosa or may cause fermentation in the stomach and intestines. The tonsils, though their physiological functions are still in doubt, to some extent probably act as pharyngeal filters, for in three instances Niles has observed attacks of acute appendicitis follow closely upon the heels of acute tonsillitis, and in each there was pus around the roots of some of the teeth. In achylic stomachs, or those markedly deficient in hydrochloric acid, pus from the mouth, as it is poured down the esophagus and over the gastric mucosa, may directly kindle an acute gastritis. This has been demonstrated to the author's satisfaction by numerous instances where local gastritis yielded to treatment only after oral conditions had been righted. Probably the majority of digestive disturbances arising from oral sepsis are put in motion by fermentations set up in the stomach and intestines. Among the most important are the lactic and butyric acid fermentations, and, as the lactic acid micro-organism is invariably found in connection with tartar and pus pockets around the teeth, we see how impossible it is to cure a chronic fermentative gastritis or gastroenteritis while reinforcements from an unhealthy mouth constantly aggravate the trouble. With the hydrochloric acid absent or deficient, antiseptic medication amounts to but little so long as the patient is swallowing fresh germs with each meal.

In gastric atony, dilatation, or pyloric obstruction, with delayed evacuation of the stomach contents, oral sepsis produces its maximum evil influence. Especially is this observed in old cases of pyorrhea alveolaris, where the pyogenic organisms, after leaving the mouth, find a larger sphere of acidity in the stagnant pool always present in the stomach. This fermentation continues with unabated energy in the alkaline and neutral secretions of the intestines, giving rise to flatulence, painful peristalsis, diarrhea, and various other intestinal ills. Appropriate diet, lavage, and antiseptics can mitigate these conditions, but no material nor lasting improvement may be expected until the fountain-head is purified.

A large proportion of the cases of indigestion met with in medical clinics arise from postnasal catarrh and pyorrhea alveolaris. From either indifference, ignorance, or poverty, these septic oral conditions are neglected, until some of the mouths presented are unsanitary marvels.

How many clinics there are where every portion of the human anatomy is carefully investigated excepting the oral cavity! A perfunctory glance at the tongue, and then away from the mouth go these diagnostic sleuths, leaving undiscovered in many instances the chief clue to some obscure digestive malady, which puzzles by its seeming etiological inconsistencies and fails to react to therapeutic agents.

The author wishes to emphasize the clinical importance of aseptic mouths and the malign influence of septic mouths upon the whole alimentary tract, and to suggest that medical men get in closer touch with their co-workers, the dental surgeons, who can so often furnish a practical solution of some vexing gastro-intestinal problems.

[*La Province Dentaire*, Lyons, February 15, 1912.]

THE INTERPROXIMAL SPACE AND INTERPROXIMAL CARIES. By Dr. M. Guibaud, Toulon.

Guibaud makes a strong plea for the conservation of the interproximal space and the gingival septum in the treatment and filling of interproximal cavities, especially in bicuspids and molars. The wedging of foreign bodies and the retention of food débris are the chief causes of the destruction of the gingival triangle, as well as the osseous tissue of the alveoli and the underlying alveolo-dental ligament. Necrosis of these tissues in time brings about the loss of the teeth involved, besides forming a gate of entrance for micro-organisms. Preservation of the gingival septum and restoration of the normal contact points of the teeth, on the other hand, guarantee the following advantages:

A normally restored contact point insures greater immunity against caries to the neighboring tooth. If small amounts of food are wedged in the normal interproximal triangle they are easily displaced by the excursions of the tongue and cheek muscles. If food is wedged between two normally placed contact points, *i.e.* those situated near the masticating surfaces, it is readily removed by mastication. If the gingival septum is not lacerated by mechanical manipulation or injured by medicinal agents, and is allowed sufficient space for the free circulation of blood, marginal caries, peridental inflammation, and bacterial invasion, all of which may produce the loss of the tooth, are most successfully guarded against.

[*Dental Surgeon*, London, March 2, 1912.]

EXTRACTION AND MUTILATION OF TEETH AMONG NATIVES OF CENTRAL AFRICA. Report of the Wellcome Research Laboratory, Khartoum.

By far the most important of the tribal cosmetic operations of the natives of Central Africa is the extraction and mutilation of teeth. This custom seems to be absolutely universal among pagan people throughout the length and breadth of Central Africa, so that Livingstone was justified in saying that "A person who has teeth is considered ugly." The teeth implicated are the lower or upper incisors, or both, sometimes also the canines. The operation is performed at puberty, between fourteen and sixteen years of age, the males always, the females usually, according to custom, being submitted to it. It is an extraction, and not a "breaking off," as has been erroneously described by Schweinfurth, Livingstone, and others. A specially constructed gouge, or simply a spear-head or knife-blade, is inserted between the central incisors and levered from side to side until these two teeth are loose enough to be prized out, after which the adjacent teeth, if required, are readily freed in like manner and removed by the index finger and thumb.

The pointing and paring of teeth, customary among those tribes who do not extract them, is carried out by the local expert, the nearest approach to a savage dentist, who roughly chips the teeth into the required shape with a small chisel, a stone being used as a mallet. These teeth are then fined down and smoothed by rubbing the surface with a hard stone.

Separating the teeth, which is an uncommon practice, is accomplished by inserting pegs of wood of gradually increasing size between them, until the required separation has been reached. On being asked the reason why the Gours extracted teeth which God had given them to bite and eat with, one made answer with this counter-question: "Why do you remove the beard and hair that God has given you and denied to us?" Livingstone, on asking the same question of the Batoka people, received the answer that they "wished to look like oxen and not like zebras." More relevant reasons are advanced, however, such as: To distinguish tribe from tribe; as a sign of the state of manhood or womanhood; simply as an ornamentation; to make a distinction between men and animals, especially monkeys. The Dinkas and Shilluks say that the extraction of teeth is necessary for the pronunciation of their language, while the Nubas add as a further reason that those very sick or suffering from lockjaw, a common disease among them, may be more easily fed. The Zandeh give the following strange reasons for the sharpening of their teeth: That they may look animal-like and ferocious; as ornament and for custom's sake alone; to bite and tear meat more effectually; to show their cannibal proclivities.

The confused distinctions of tribe as marked by dental operations are further elucidated by the following differences: The Zandeh Nyam-nyam custom is to mutilate and not to extract teeth. Contact, however, with the Gebelawi Nyam-nyam has given rise to frequent extractions of the lower two or four incisors, sometimes combined with pointing of the corresponding upper teeth. The usual Zandeh custom is, then, to sharpen or point the four upper incisors and the two central or all four lower incisors, according to various designs. The Avungara—or royal house—often leave their teeth entirely uninterfered with, or may sharpen or notch the two central upper incisors.

The Amieumba and Abangbinda sharpen the four upper or upper and lower incisors. Both sexes of these tribes are similarly treated, though the custom among the females is not universal. The Gebelawi Nyam-nyam, as a general rule, remove the four, sometimes only the two central, lower incisors; in this way they resemble the kindred Gours. From contact with the Zandeh, however, they have acquired the custom of sharpening and notching their teeth solely or in conjunction with extraction. The Bakka perform simple extraction of the four lower incisors, extraction of the four lower incisors combined with the sharpening of the four upper incisors, extraction of the four lower incisors combined with separation of the two upper central incisors, notching of the two upper central incisors alone, or they leave the teeth quite undisturbed. As another example of this great confusion of custom, the Makrakka and Bagaro sometimes leave their teeth unaltered, sometimes they extract the lower incisors or merely notch the upper central incisors. The Mundu, Morro, and Avokia adhere nearly always simply to the removal of the four lower incisors.

The Gour tribes almost universally extract the four lower incisors. Sometimes they remove the two lower canines at the same time, or combine extractions of the four lower and the two upper central incisors. The teeth removed are perforated and hung in a necklace. Little or no facial deformity results, as a rule, from the extraction of teeth, though the unopposed incisors usually spread outward, inward, or forward.

[*American Journal of Pharmacy*, Philadelphia, February 1912.]

CORUNDUM. By W. C. Gold, Philadelphia.

During the last decade there has been a marked increase in the use of corundum for the manufacture of grinding wheels. This is solely due to the discovery of an immense deposit of corundum ore at Combermere, Barry's Bay, Ontario, Canada. Some corundum is mined in India, from which India oilstones have been manufactured, some in Australia, and a little in Montana and Georgia, although the latter mines have been practically abandoned, the supply becoming exhausted. Years ago, there was considerable corundum mined at Hilltop, near Asheville, N. C., but these mines, too, were abandoned, owing to the cost of the mining becoming too great. The finest corundum ever produced came from near Unionville, Chester county, Pa. These mines were worked until 1893 and then abandoned, as the corundum was found in pockets only.

There are a number of varieties of corundum—sapphire, pink, cream, and white. The quality depends solely upon the percentage of alumina or aluminum oxid. The Canadian corundum, when perfectly cleaned, contains about 95 per cent. alumina, the Southern corundum only about 75 per cent. The specific gravity is from 3.95 to 4.05; pure corundum is number 9 in the scale of hardness, the diamond being rated as 10.

All Canadian corundum, after being crushed, is subjected to a complicated process of cleansing and "concentrating," by which all micaceous admixtures and other foreign matter, iron, and low-grade ore are removed, so that but eight per cent. of the ore mined results in commercial corundum. The numbers range from 6 to 180, that is, from the coarsest to the finest grain, F, FF, etc., indicating "flours." Unless pure corundum is used in the manufacture of grinding wheels, they are apt to crack, the vitrified wheels being exposed to about 2500° F. The consumption of corundum in this country, both for grinding wheels and polishing purposes, is about one million pounds per year, the demand being greater than the supply.

The advantage in the use of corundum over emery for grinding purposes is that corundum is harder and sharper, has a better "fracture," more rapid cut, and greater durability. It successfully competes with the two artificial abrasives, alundum—electrically treated bauxite—and carborundum—carbid of silicon.

[*Journal Odontologique de France*, Paris, January 1912.]

RESTORATION OF THE LINGUAL CUSP IN BICUSPIDS. By H. Léger-Dorez.

When the lingual cusp of a bicuspid is to be restored, the remaining tooth is prepared, sterilized, and the labial root-canal filled, while in the lingual root-canal the apical foramen is sealed and a platinum pivot is introduced, extending from the root-canal to about one-third the height of the remaining natural cusp. This protruding portion of the platinum pivot is then flattened, and a hole punched in it for passing a gold wire horizontally to the floor of the cavity. With the platinum post in position an impression of the bicuspid is taken and removed, and a model is cast in plaster, when the platinum pivot will be found in the plaster model in the same position as it will occupy in the tooth. A conical gold wire is then fitted in the hole in the flattened portion of the platinum pivot, the plaster model, pivot, and wire are thoroughly oiled, and the artificial cusp is built up in inlay wax and carefully articulated. The sprue wire is inserted, the whole model with the wax cusp thoroughly cooled in ice-water, the conical gold wire carefully withdrawn from the wax model with a pair of flat pincers by gently rotating it, the wax model removed from the plaster model, the holes carefully filled with investment material, and the inlay cast, preferably in 22-karat gold. The hole in the platinum pivot is then threaded, the finished inlay tried on the model, the pivot and inlay tried in the cavity—which has been slightly oiled—and, after temporarily removing the gold inlay, a small bur is passed through the eye in the platinum pivot, and a retention pit burred in the posterior cavity surface of the natural cusp, to insure firmer retention of the gold-wire pin. This gold wire is then counter-threaded, and the pivot, gold inlay, and retention pin sealed in their respective positions with thinly mixed cement. The excess of the gold wire is cut off at the lingual surface and polished flush with the lingual surface of the inlay.

[*Zeitschrift fuer Zahnaerztliche Orthopaedie*, Berlin, October and December 1911.]

A BY-EFFECT OF LIGATURES. By F. Carls, Hamburg.

A CONTRIBUTION TO THE ROTATION OF LIGATED TEETH. By Dr. R. Langendorff, Vienna.

A very disagreeable by-effect of wire ligatures was observed by Carls in a case of class I, division 1, where the crowns of the central incisors, which had been ligated to the expansion arch, gradually deviated from the median plane, rotated, and diverged distally. The mechanical principle to which this undesirable effect was due can be demonstrated by clamping two parallel sticks into a vise, and ligating them tightly to a cross bar. If the vise is released, the upper ends of the sticks, representing the roots of the teeth, will approximate, while the lower ends, representing the crowns, diverge. In ligating teeth to the expansion arch, the arch is slightly bent, bringing about a mesial or distal inclination of the teeth which are slightly movable in their alveoli. This explains why ligatures become loose although the tooth was ligated firmly to the arch, also why patients feel pain when a loose ligature is tightened. Silk ligatures become loose rarely, and only after having been in place some time, as they possess a slight elasticity. For intentional rotation and inclination of teeth they are, however, unsuitable. If the above-described effect is to be obtained intentionally, the strongest Angle ligature wire must be employed. This effect of wire ligatures can be utilized also in moving two teeth together bodily. If, for instance, the two central incisors are to be approximated, they are ligated with wires to the arch, and a silk ligature is passed, drawing the two wire ligatures together. In this way the teeth are moved together bodily, the wire ligatures drawing together the roots, the silk ligature the crowns.

The same principle may be applied for the bodily movement of bicuspids and molars. For the manner in which these wire ligatures must be passed in order to obtain either a distal or a mesial movement of the tooth, Langendorff gives a very simple rule: All ligatures in which the arch touches the ligated teeth produce a lateral inclination of the tooth crowns. The crowns become inclined always toward that side on which the ligature passes between the gum and the expansion arch, and diverge from that side on which the ligature passes between the crown portion of the tooth and the arch.

[*L'Odontologie*, Paris, February 15, 1912.]

ANTISEPTIC TREATMENT OF CARIOUS VITAL TEETH WITH TINCTURE OF IODIN. By P. Vanel, Paris.

Rejecting carbolic acid, 90 per cent. alcohol, formol, zinc chlorid, and nitrate of silver, either on account of lack of bactericidal action or untoward effects upon the dentin or pulp, and desiring an ideal antiseptic of both penetrating and tonic effect, Vanel employs tincture of iodin for the sterilization of prepared cavities in vital teeth. He prefers this drug because of its strong bactericidal power, its not only innocuous but tonic action upon the pulp, its easy manipulation, and great diffusibility. After the cavity is properly prepared, the dentin is desiccated with hot air and swabbed with a tiny pellet of cotton saturated with the iodin. No pain whatever is felt, unless the cold iodin is applied too soon after the hot-air blast. The cavity is then temporarily filled with gutta-percha; after a few days the permanent filling is inserted.

Whether he uses this method also in anterior teeth, or how he prevents or counteracts discoloration of the teeth thus treated, the author fails to state.

PERISCOPE.

Glass-Stoppered Bottles for Volatile Substances.—When volatile substances are placed in glass-stoppered bottles, the ground portion of the stopper should be moistened with glycerin. This not only makes a more effective seal, but prevents the stopper from sticking.—A. P. LEE, *Dental Brief.*

Temporary Retention for Loose Upper and Lower Incisors.—Ordinary Angle orthodontia wire is rolled to a ribbon, annealed and gold plated. Starting from left to right the wire is forced down between the bicuspid and canine, and laced, carrying the strands over and under, so as to lock them. At the right canine, one strand is wound around the other, and forced between the canine and bicuspid so as not to irritate the lip.

When there are one or two loose teeth, the wire is carried to the adjoining teeth only.—J. W. JUNGMAN, *Dental Summary.*

Treatment of Mercurial Stomatitis with Salvarsan ("606").—Salvarsan has been successfully tried in a case of stomatitis such as occurs especially after the use of mercurial ointment. Before treatment with salvarsan was instituted, extensive necrosis of the palate and velum seemed inevitable. After the first intravenous injection of salvarsan these symptoms disappeared with surprising rapidity, to reappear after one week. A permanent result was, however, obtained after the second injection.—R. LE BLAYE, *Le Laboratoire et Progrès Dentaire.*

Repair of a Gold Crown with a Broken Surface.—With the broken, cut, or torn crown in position upon the root of the tooth, an impression of the broken surface is taken with modeling compound, the impression and crown are removed from the mouth, the crown is replaced in the impression, and platinum inlay foil is burnished over the broken surface on the interior surface of the crown. The crown is then filled with investment material, and solder flowed on the exterior surface of the platinum matrix, uniting the edges of the broken surface. By this means an exact reproduction of the missing portion of the crown is obtained.—W. F. WILSON, *Dental Summary.*

Public School Dental Clinics in Sweden.—In the matter of school dental clinics, the *Daily Telegraph's* correspondent at Stockholm reports that Sweden leads the way. "She clearly sets the pace among those northern nations which do so much justice to their vigorous mentality and the freshness of their outlook upon the responsibilities of civilization; and if she has not the romanticism of her neighbor and late partner, Norway, at least she carries the spirit of the higher utilitarianism out to perfection. With only a twelfth of Germany's population, Sweden has at least a third of her total of dental surgeries in schools, and the practice is strictly followed by keeping a dental journal in respect of every child. Free treatment is giving way to a system of discretionary contributions, on the just rule of payment for value received where payment is possible, and on the working principle that defrayal increases appreciation of the benefits bestowed. Certainty that the state is pursuing the right line is made still more certain by virtual unanimity among the teachers that the health and spirits of the children have sensibly improved. The swollen cheek is seldom pleaded in excuse for absence, and hand in hand with a better attendance goes the priceless blessing of closer attention to work. Perhaps, in view of such solid results, a little attention on our own part will lead to fuller emulation in the right official quarters."—*Dental Record.*

Securing Separation for the Adjustment of Clamp Bands in Orthodontia.—To facilitate the adjustment of the clamp band it is advisable to get a slight separation, both mesial and distal—if there be a tooth distal—to the tooth which the band is to encircle. This may be done by passing a heavy ligature wire through the interdental space, bringing the two ends together and twisting them tightly around the approximal contact points of the teeth to be separated. If this wire is worn for a few days there will be sufficient separation so that the band may be easily worked to place, except in some adult cases, which may require some other method of tooth separation.

In these cases as well as in younger ones, ligature silk has been found very efficient for this purpose, and is used as follows: A double strand of fine floss silk, engaging a loop of ligature silk No. 3, is passed by the contact points, and the loop of the ligature silk is drawn through the interdental space to the buccal side, leaving the two free ends presenting lingually. The floss silk is then removed, leaving the ligature silk between the teeth. One end of the ligature silk is passed through the buccal loop, the other end is grasped and drawn taut, and the two securely tied together around the approximal contact points, clipping the surplus ends. Through the shrinkage of this silk ligature, sufficient space for the easy fitting of the clamp band may be obtained in any case.—J. L. YOUNG, *Items of Interest.*

Moving Canines, Bicuspids, and Molars on One Side, Buccally, in Orthodontia.—Usually, when such a movement is necessary in either dental arch, the malposed teeth are inlocked by those of the opposing jaw. In order to overcome this inlocking without displacing the teeth on the opposite side, some precaution is necessary. It is obvious that it will not do to depend on the reciprocal force of the expansion arch. The attachment to the teeth on the normal side should be as nearly stationary anchorage as possible.

This may be accomplished in various ways, but the one here described seems the most applicable. The canine on the normal side is fitted with a plain band, and a rigid wire is soldered from the end of the screw of the clamp band to the canine band. This necessitates care being used while cementing these bands in place, but the canine being easy to fit, there will be little danger of the band coming loose. The buccal tube is so shaped that the expansion arch cannot rotate in it, and should be so placed on the band that the expansion arch will lie close to the bicuspids and canine on the normal side. The other end of the expansion arch should lie on the same plane, both from a vertical and horizontal view, when passive, with the buccal tube which is to receive it, and should stand away the distance it is necessary to move the malposed molar buccally.

The arch is then inserted into the tube, with the nut so placed that the arch lies very close to the incisors. As the inlocked molar moves buccally, the nut on the arch on this side should be turned up from time to time, so that the arch does not press on the incisors. If this end of the arch should tend to slip forward out of the buccal tube, it can be prevented by the adjustment of a rubber ligature over the back end of the tube and over a small hook soldered on the arch in front of the nut. When the molar reaches its proper position, the second bicuspid may be ligated to the arch, and so on, one at a time, until all the malposed teeth are brought into proper position. In this way, it will be seen that four teeth on the normal side, two of which must move bodily if they move at all, are pitted against the inlocked molar. Subsequently, this molar can be straightened up by the proper application of retaining appliances.

Further reinforcement of this anchorage can be obtained by the use of intermaxillary rubbers on each side.—J. L. YOUNG, *Items of Interest.*

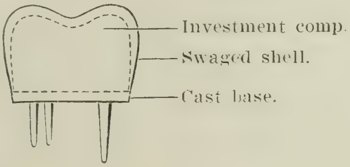
HINTS, QUERIES, AND COMMENTS.

HOLLOW GOLD SHELL CROWN WITH CAST BASE FOR BADLY DECAYED POSTERIOR TEETH.

FOR crowning posterior teeth the crown portion of which is completely decayed, but the roots of which are sufficiently well preserved to be put in sanitary condition, the following procedure is recommended:

The crown is ground down level with the gingival line, covered with temporary stopping, and the bite is taken in impression wax. Posts are then introduced into the canals and bent parallel to one another, and inlay wax is pressed into the pulp chamber and carved to form a base, as shown in the accompanying illustration. Before being inserted into the root-canals, the ends of the pins are coated with borax.

With the wax base in position, an impression is taken in plaster. This impression is coated with a separating fluid, and a model is poured in investment compound. The model is separated from the impression, care being taken not to distort the wax base. The case is set up on an articulator, where the wax base may be trimmed as thin as desired. From a collection of plaster models one is selected that will best fit the case. This model is carved to fit the wax base in diameter, less the thickness of a piece of No. 30-gage gold plate. If the model is carved to the same diameter as the wax base, the finished crown will be too large.



A gold shell is swaged, well reinforced with 20-karat solder, and fitted to the wax base. The shell is filled up to within 1-16 of an inch of the neck with investment compound, and waxed to the wax base. Borax should be applied to the neck portion of the shell, inside and outside. The portion of the model that holds the case is cut away, invested, and the base is cast, using 18-karat gold solder. Care must be exercised not to disturb the posts. In order to cast properly, the case must be dried out slowly and thoroughly, care being taken not to allow the ring to become red hot, lest the gold inside become oxidized, when union of the metals will not take place. The solder should be heated as much as possible.

This form of crown is especially indicated for lower bicuspids and molars.

Bernard Fischler, D.D.S.

Brooklyn, N. Y.

BRIDGE WITH POSTERIOR CAST GOLD INLAY ABUTMENT.

Before consulting the writer, the patient had several bridges made, anchored to a gold crown over the lower molar, the crown portion of which had been worn down almost completely to the gingival border. The upper opposing molar had elongated so that its occlusal surface fitted into the cavity in the lower molar in ball-and-socket joint fashion.

It was deemed impracticable to attach a bridge which was to carry three teeth to an abutment gold crown the height of which could not be more than 1-16 of an inch.

Fig. 1.

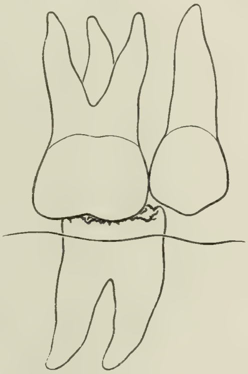
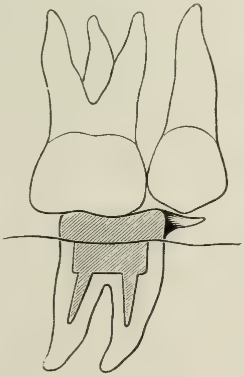


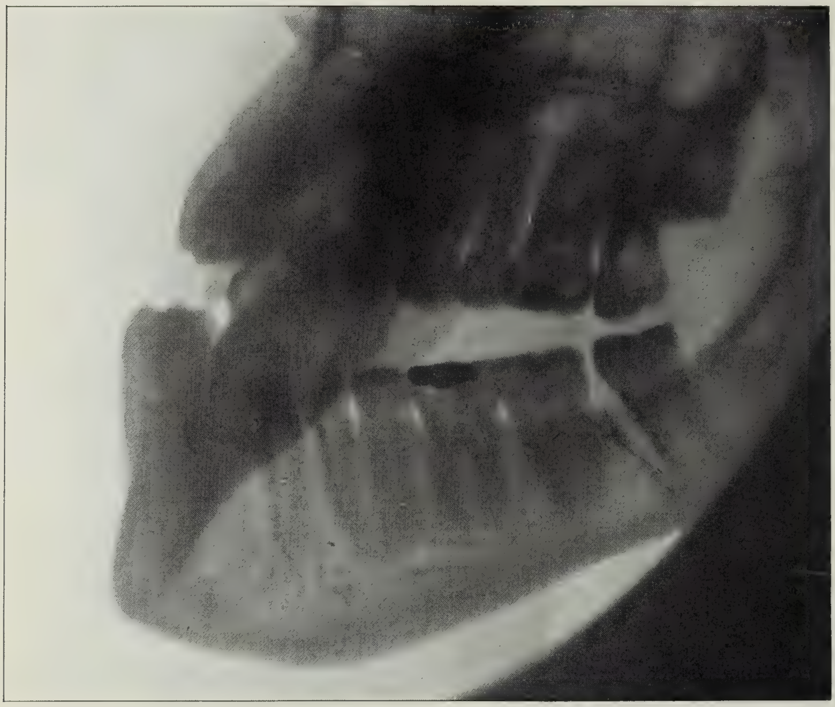
Fig. 2.



Very little pressure on the gold crown over the bicuspid which had to be employed as the anterior abutment would have been sufficient to dislodge the molar crown. The cavity in the molar was therefore properly shaped up, and the roots were prepared for the reception of posts of No. 16-gage iridio-platinum, one in each canal. The ragged portion of the crown of the tooth was ground down level with the gingival margin. With the posts in place, a wax model for a gold inlay was made, the posts being removed with the wax model. The inlay was then cast and used as the posterior abutment for the bridge, as illustrated in the accompanying figures.

Samuel S. Beck, D.D.S.

New York city.



A CASE OF FRACTURE OF THE LOWER JAW, DIAGNOSED ONLY BY MEANS OF THE X RAY.

Through the kindness of D. Harry C. Will of Chicago, I am able to report the following interesting case:

Mr. A. R. P., a member of a roller-skate polo team, was struck by an opposing player's shoulder in the jaw. He continued playing for awhile, when he noticed that one of his teeth was inclined inwardly. Thinking that it had been broken, he tried to right it, and in the effort he felt a sharp painful crack on the left side of the lower jaw, and was subsequently unable to move the jaw. Dr. Will was not able to detect any crepitation, and referred the patient to me for an X-ray examination. The plate, taken by the method of Dr. Haenisch of Hamburg, showed an oblique fracture of the jaw, extending on the anterior surface closely following the root of the last molar.

To avoid the interposition of the other jaw upon the plate, Haenisch recommends hanging the head downward on an incline, so that in the lateral position the tip of the nose is in contact with the plate. By means of the compression diaphragm, the tube is then centered right above the angle of the jaw.

Max Reichmann, M.D.

Chicago, Ill.

OBITUARY.

[SEE FRONTISPIECE.]

WILLIAM HENRY GILBERT.

DIED, at his home, No. 4726 Springfield ave., Philadelphia, on Saturday, March 16, 1912, from pneumonia, WILLIAM HENRY GILBERT, in the sixty-fifth year of his age.

> "HE has achieved success who has lived well, laughed often, and loved much; who has gained the respect of intelligent men and the love of little children; who has filled his niche and accomplished his task; who has left the world better than he found it, whether by an improved poppy, a perfect poem, or a rescued soul; who has never lacked appreciation of earth's beauty or failed to express it; who has looked for the best in others, and has given the best he had; whose life was an inspiration, his memory a benediction."

It is good to study the life of a man who has achieved so high a measure of success as this statement pictures; better to have known that life as it developed, to have felt the expansion of character that came as the years passed till the full stature of such a man as William H. Gilbert was reached; best of all if we can so make the value of such a life a part of ourselves that we may in turn become an inspiration to others, our memory a benediction.

William Henry Gilbert, the youngest son of David and Mary C. Gilbert, was born in Philadelphia, June 30, 1847. He attended the public schools until 1862, when he entered the employ of Dr. Samuel S. White. After a few months' service in the tooth factory of his employer, he went into his father's machine-shop, where he continued about a year. He next engaged with Little & Adamson, in the wholesale dress goods business, remaining with them until July 7, 1864, when he enlisted in the 192d Pennsylvania Volunteer Infantry. In November, his term of enlistment having expired, he was honorably mustered out of the army. He then secured a position with French, Richards & Co., wholesale druggists, leaving them in the early part of the April following, and within a week afterward, April 9, 1865, again entered the employ of Dr. S. S. White. After two years spent in the factory, he was transferred to the salesrooms, where he worked up through the various grades till in 1873 he became stock clerk and buyer. In this responsible position, which he was holding at the time of Dr. White's death in 1879, he was continued on the formation of The S. S. White Dental Manufacturing Company in 1881. In order to relieve the President and General Manager of constantly increasing duties occasioned by the rapid expansion of the business, Mr. Gilbert was in 1884 appointed General Superintendent of Manufactures and Branch Houses, a position created especially for him. His detail knowledge of the manufacturing operations of the Company and of the business generally enabled him to make many large improvements in the way of systematization.

In June 1891, upon the death of Dr. James W. White, President of the Company, Mr. Gilbert was elected General Manager. In this position, while still keeping in close touch with the manufacturing department, he demonstrated his great abilities in another field, instituting a complete change in the financial methods of the Company, involving the creation of a modern credit system.

The condition of the trade in continental Europe, caused chiefly by imitation of the Company's manufactures, led him to advocate the opening of a branch house in Berlin, Germany, which from a very small beginning has grown to large proportions.

In February 1906, Mr. Gilbert was advanced to the presidency of the Company owing to the death of his predecessor, Mr. Henry M. Lewis. His intimate knowledge of the business, of its needs and its possibilities, his sound judgment, and his habit of planning for the future, had fitted him admirably to grapple with the problems of administration; with enlarged powers he was able to still further work out the policies which in his judgment would best serve the onward progress of dentistry, believing as he did that the prosperity of the Company was indissolubly linked with the advancement of the profession.

Mr. Gilbert's death, in the full fruition of his great powers, was a real grief to all the employes of the Company and to a wide circle of friends. Somewhat worn with a particularly arduous year of work, he was in the midst of preparations for a vacation, when he was stricken—in his office—with a severe chill. Pneumonia developed and there were anxious days and nights. Then came the joyful news that the lungs had cleared and that all looked well; but edema supervened, and the clear, far-seeing, kindly eyes were closed to earthly scenes, the strong, manly voice that could ring with command or breathe the gentlest words of sympathy, was hushed forever.

The funeral services, which, in accord with his wishes, were simple, were held in the presence of a large concourse of sorrowing friends on March 19th. Interment was made in Woodlands Cemetery.

Mr. Gilbert is survived by a married daughter, and a grandson and granddaughter, the children of his deceased son, his wife having died about a year ago.

In the death of William H. Gilbert there passed one of the greatest and noblest figures in the development of modern dentistry. The dental profession in general, I am sure, can hardly realize how much they owe to his work in maintaining and raising the standard of quality in the instruments, appliances, and preparations with which their beneficent work for their patients is done. Mr. Gilbert, like all men of positive character, had his share of detraction, even vilification, and it is quite possible that some members of the profession have formed a wrong impression of the man and his methods. These will be especially interested in what is here said.

The older members of the dental profession know that to the founder of this house, the late Dr. Samuel S. White, was due the raising of the quality of dentists' supplies to a standard before unthought of; that the foundations of this business were laid in the superior quality of its products, a superiority which was maintained—advanced wherever possible—during his lifetime. Mr. Gilbert came into full direction and control of the manufacturing interests of the house less than five years after the death of Dr. S. S. White, by whom he had been trained. The two men had many characteristics in common. Both were broad-minded, liberal, and honest to the core, possessed of spotless integrity, with a keen sense of justice. Mr. Gilbert was Dr. White's loyal and legitimate successor, the one man qualified by character and training to take up and carry forward the work when it came to him. With the aid of modern improvements not available to his great exemplar, he did carry it to even greater heights.

Believing in the destiny of dentistry as a progressive profession, he would not countenance any step which meant a lowering of the quality of a product, because it would mean lessened efficiency to the dentist. As an example, when the base-metal pin delusion arose, he utterly refused to sanction its introduction into the Company's manufactures. "Show me," said he, "a substitute which will really take the place of platinum as a material for the pins of teeth and do its work equally well in the mouth, and we will adopt it; not otherwise." That was his decision as a matter of principle, and he stood like a rock upon it, although it meant the renunciation of a very profitable business. And he was justified by the outcome.

His conduct was based on equity; he was a shining exponent of the square deal for all men. He approached a business proposition in this spirit: "If I judge this proposition on the principle of absolute equity to the interests I represent, it must be—cannot help being—equitable to the other side."

A prominent practitioner relates this incident: A dentist went to Mr. Gilbert, claiming that the Company had wronged him. Mr.

Gilbert said to him, "There is always a chance for an error in these matters, and there may be one here. But before we look into that, let me say to you that if we have wronged you inadvertently, we will make good your loss; if you can show that we have wronged you intentionally, we will go farther, will recompense you according to the old biblical standard, and repay you 'seven times' your loss." The investigation showed a misunderstanding on the part of the patron at the bottom of the trouble.

He set his face resolutely against underhand methods or unfair dealing toward competitors; would not permit misrepresentation of competitive goods, insisted that advertising must be strictly truthful, without exaggeration—prospective patrons must not be misled by disparagement or over-statement.

Every step he took was reasoned out beforehand. Possessed of rare analytical powers, he weighed the evidence carefully before reaching a conclusion. Whatever the problem, he went to the heart of it, and it was remarkable how clearly he saw the practical bearing of every question. Once his decision was reached, he adhered to it with a resolution which never wavered, a courage which never faltered. Naturally aggressive, it was his habit, when once a line of policy was determined upon, to "force the fighting." He believed in plain speech. If you have a difference with a man speak out your mind, that the misunderstanding may be cleared up. And he was a formidable antagonist in a dispute within the range of his activities. Almost invariably you would find that he knew your case at least as well as you did, that he was prepared to batter down your argument with incontrovertible facts and figures, and establish his own impregnably, and you would go out from his presence feeling that you had met a man who was master of himself and of his subject.

There you have the keynote to his power—absolute mastery of himself and his subject. His subject was the business of The S. S. White Dental Manufacturing Company; it was his life, which was devoted to it with a loyalty that never hesitated and he was absolute master of its every detail. His phenomenal memory enabled him to carry not merely the general facts, but the most minute particulars. Stored away in his mind was an exact record of almost every scene he had ever passed through, enabling him to recall at will even trivial occurrences and conversations. He could, at any moment, detail the processes by which any one of the thousands of articles manufactured by the Company was made. So all through the other departments of the business.

To his knowledge of affairs, he added another indispensable qualification for effective leadership,—a keen judgment of human nature which enabled him to find talent, and a faculty for training and developing it when found. Honesty and courage were prime requisites. Given these, he inculcated thoroughness and encouraged individuality: Know your work, think out its problems for yourself, be unafraid of its responsibilities, have the courage to state and stand up for your judgments, and you will be equipping yourself for higher duties. Always a teacher, he was a maker of men, and thus built up a service which for loyalty and efficiency has rarely been equaled. In every department of the Company's work will be found strong, capable men, fitted to go up higher. Mr. Gilbert's task was not confined to organizing a great business system. He provided the human equipment to operate it, a body of men able, willing, and ready to carry forward the cause to which his life was devoted, the uplift of practical dentistry.

Extraordinarily gifted for business pursuits, Mr. Gilbert deservedly ranked with the great captains of industry,—not in the baleful sense in which the term is so often used, but as a wise, far-seeing, forceful, beneficent director of great works; a man who could wield great power without abusing it, who could command without tyrannizing; who received loyal, heartwhole service because of the personal sympathy between him and those under his control. He had the deep respect, the sincere admiration, the warm love of every employe. To them his life has been an inspiration, his memory will be a benediction.

Frank L. Hise.

Mr. Samuel S. White, Jr., has been elected President of the Company as Mr. Gilbert's successor.

DR. JOSEPH P. MICHAELS.

DIED, at Paris, France, March 24, 1912, of uremia, Dr. JOSEPH PORTER MICHAELS.

Since about January 1st Dr. Michaels had not been up to his usual physical form, and about one month ago he confided to an intimate professional friend that he was excreting two grams of albumin daily, was suffering from interstitial nephritis, and had been put on a milk diet, various other dietetic precautions having also been instituted in harmony with his condition. He, however, proceeded with his professional work as usual, giving all his available time to an important restoration case involving a prosthetic mechanism of such an elaborate and extensive character that he had determined to make it his final and real *chef d'ouvre.* The work was progressing to his satisfaction and offered opportunities and scope for the exercise of all his powers of invention, research, and genius to bring it to a successful termination—as he was certain to do had he lived long enough; but his great sympathy for the patient, with the necessity which she felt to get through with the work, caused him to strain his energies to the utmost limits. Although in pain, and moving about with difficulty, and weakened by imperfect nourishment and by the progress of his disease, when he should have been in quiet repose, he continued his arduous labors on the case incessantly.

On the evening of March 18th he was seized with a severe attack of angina pectoris; this was finally gotten under control by three o'clock the following morning, but he never left his bed afterward, and grew rapidly worse. For two days before his death he was in a state of uremic coma with convulsions—a disease of which he himself knew every phase. He died at ten o'clock Sunday, March 24th, at the little Hotel d'Orleans, in rue Jacob, which is not far from the École de Stomatologie, and in which for that reason he had taken up his residence a few years ago.

The funeral was held Wednesday, March 27th, at the little Protestant church l'Église Evangelique du Luxembourg, and the interment was at the Cimetière Montmartre. The funeral was attended by the most representative men of all the societies, all of which sent floral wreaths and were represented by their highest officials. After a short service at the cemetery, Dr. Chompret, the assistant director of the École de Stomatologie, in the unavoidable absence of its director, Dr. Cruet, delivered a beautiful and impressive address, a real apotheosis of Dr. Michaels. An appreciative address was also delivered by Dr. Isaac B. Davenport, his lifelong intimate friend.

Dr. Michaels was born in New York city, September 10, 1838. He was educated in the public schools of the city, and began the study of dentistry in 1853 with Dr. Latson, subsequently with Dr. Dalrymple, and afterward with Dr. Ryder, distinguished practitioners of that time in New York. In 1858 he decided to go to Europe, and for upward of one year was an assistant to Dr. Ballard in London, England. In 1859 he went to Paris and became an assistant under contract to Dr. Preterre, in which connection he remained until 1868.

It was while he was associated with the house of Preterre that he produced the wonderful collection of casts and appliances now deposited in the École Dentaire de Paris, and known as the Preterre Collection, which has taken prizes at all the great expositions in France since 1862, among others the Grand Prix d'Honneur in 1867. This collection after the death of Preterre was purchased by the late Dr. Lecaudey, a lifelong friend of Dr. Michaels, and presented to the Dental School of Paris. The entire collection, with the exception of a very few pieces of later date, was the work of Michaels when he was an assistant under contract in the employ of Preterre, who scoured the Paris hospitals to furnish material for his Yankee mechanic, and the result was used to advertise the Preterre house.

His artistic genius and his wonderful skill as a technician attracted the attention of the late Dr. Thos. W. Evans, who formed an association with him which resulted in the sending of Dr. Michaels to Vienna, Austria, where he opened an office for the practice of dentistry in the mutual interest of himself and Dr. Evans, in which place and connection he continued to practice until 1875, when he returned to Paris and began the practice of his profession there upon his own account.

What may be termed the conventional limi-

J. P. Michaels

tations of dental practice constituted too narrow a professional environment for the activities of Dr. Michaels. His constructive genius, his insatiable desire for knowledge, and his keen interest in all scientific matters drove him into the investigation of the problems of nature as they came under his notice, and he devoted his life and energies to their solution. In the more immediate interests of his professional life he devoted much time to hospital service, to giving instruction in the dental schools of Paris, and the conduct of a large private practice, yet he found time to devote what may be fairly designated as his surplus energies to many things not directly connected with his immediate professional work.

His mechanical instincts led him to the study of mechanics as a hobby, and at various times he made a number of useful inventions in the way of instrumental appliances, electrical machinery, generators, motors, etc. His scientific interests led him into the extensive study of chemical biology, histology, and dental pathology. He gathered together an extensive collection of prehistoric human teeth and dental pathological specimens containing many unique examples of teeth and bones, human and animal, of past geologic ages, as well as a large collection of normal, pathological, and anomalous human teeth, many of which were used for the illustration of his lectures by the exhibition of the specimens themselves and through the medium of an extensive collection of lantern-slide photographs for projection.

As a prosthetist he exhibited an originality and genius which gave him a unique position. In 1894 Dr. Michaels astounded the medical and surgical world by his successful restoration by means of a specially designed mechanical appliance, of the lost parts of the shoulder-joint after removal of the upper half of the humerus, replacing and uniting the bones, over which the tissues healed. The case is described with illustrations in the *Bulletin de l'Académie de Médecine,* also in *l'Odontologie* and *Revue Internationale d'Odontologie* of May 1894. Another equally striking restoration which he made by a special appliance was the replacement of the parts lost after total loss of the larynx, the superior portion of the esophagus, and the inferior portion of the pharynx, from epithelioma, in the case of a patient in the Hôpital Saint Jean de Dieu, in 1895. This ingenious mechanism permitted of the food being swallowed directly from the mouth, and united the superior passages with the trachea for the transmission of air and the production of sound. The operation and appliance is described in *Bulletin de l'Académie de Médecine* and other medical journals of Paris.

In this and numerous other extensive prosthetic restorations which Dr. Michaels produced he not only opened new avenues of usefulness to our profession, but rendered a real service to humanity by restoring to comfortable and even happy lives a class of unfortunate sufferers who without such aid would have had but a brief and often intolerable existence. While the two cases here referred to are perhaps the most striking of the restorations made by Dr. Michaels, the list of sufferers similarly relieved by him through the agency of intelligently designed and successfully executed prosthetic appliances is almost innumerable.

In the domain of biological chemistry the most important and valuable work done by Dr. Michaels is that pertaining to the chemistry of the saliva and other bodily secretions. He early announced as the result of his conclusions that the saliva of man is a living liquid material with organoleptic, physical, and chemical properties which, when properly understood, presents a picture or reflex of the nutritional state of the body; that when in a state of chemical equilibrium or normality it signifies the eucrasic state, and when abnormal in its chemical relationships it creates a dyscrasic state. Upon these major premises he sought by his researches to establish the diagnostic importance of the saliva in connection with various forms of malnutrition and often of acute disease—a work in which he was eminently successful. His abilities as a diagnostician, enhanced by means of his own methods of saliva investigation, caused his services to be sought by many eminent physicians in the unveiling of the causes of obscure disorders having their origins in conditions of malnutrition. In the pursuit of this special investigation he made extensive studies of all the bodily excretions and of the blood, and was personally convinced that he was able to diagnose from blood examinations the existence or even the predisposition to cancer, which he regarded as dyscrasic in its origin.

To Michaels more than any other man is due the extensive interest which has been aroused in the study of the saliva as related to dental and oral disease. His papers on that subject have excited widespread interest, and the assurance which he himself felt with respect to the accuracy of his findings he was able to impart to others, so that his pioneer work is certain to bear fruitful results in the labors of those who have been inspired by him to activity in this attractive field of investigation.

It is gratifying to know that during his own lifetime his labors were appreciated by his contemporaries. He received many expressions of appreciation and acknowledgment of his splendid work, among others from the Société Odontologique, the Grand Medal of Honor; from the French government, the cross of the Legion of Honor and the *palmes* of Officier d'Académie. He was an officer of the Order of Leopold II of Tuscany, a knight of the Order of Ernest August of Hanover, an officer of the Order of Danilo I of Montenegro; he also received the diploma and medal of the Société d'Encouragement des Sciences of France, and held honorary membership in many societies of Europe and America. He was a charter member of the Paris branch of the Sons of the American Revolution, a member of the École Dentaire de France and the Société Odontologique, also of the Société Internationale des Electriciens de France, and of the American Dental Club of Paris. He was the author of many scientific works especially devoted to dental science, and at the time of his death was actively engaged in teaching, holding the position of Professeur Honoraire and Directeur des Travaux Pratique in the École Française de Stomatologie de Paris.

At all stages of his career Dr. Michaels was the pioneer, the leader, the genius who opened the way into new fields of activity. His natural qualifications were such that he quickly mastered the known, and then without hesitation and with the intrepidity of the explorer blazed his way into new fields, thus opening up the path for others to follow. Endowed with a superb physique and redundant health and energy, he was untiring. His daily habit was to rise at four or five o'clock in the morning and spend the hours in the study of his books until he breakfasted. He worked continuously through the day and until late at night.

His pleasure, his real happiness, he found in his work, yet his happy, sympathetic, lovable disposition craved comradeship, and when he gave himself over to the delights of friendly intercourse he had the youthful and elastic spirit of the boy. He was at all times a delightful companion and sympathetic friend, helpful to the point of great personal sacrifice in every instance where his aid was desired by the earnest seeker for knowledge. Instantly intolerable of the slothful and insincere, he had no patience with the individual who merely desired to climb into prominence through the agency of so-called scientific research, but for the real lover of truth, the seeker for knowledge for its own sake, he was the kindly helper, the ever-faithful instructor.

It is interesting to note that while many honors had been showered upon Dr. Michaels in recognition of his valuable services to his profession and to humanity, his intellectual greatness was the achievement of the self-educated man. His early training, acquired in his youthful days during the old *régime* under the apprenticeship system then in vogue, did not embrace a college course of instruction, nor was he the holder of either academic or professional degrees. His attitude toward those who were inclined to belittle his qualifications by reason of his lack of the conventional badges of professional culture was interesting to note; his answer to all such criticism was not controversial or polemic in character, but the silent and effective argument of superior ability and intelligence. He followed no man, but set the pace and the standards for others to follow, and the ultimate demonstration of his superior abilities was the fact that he was charged with the responsibility of teaching the holders of the medical qualification in a school devoted to graduate instruction.

He stood alone in his particular field. His life-work has been a demonstration of the possibilities for usefulness that our profession offers when rightly understood and faithfully applied. His noblest monument is the record of his splendid achievement and the true greatness of real service which he has left to those who knew him best.

Dr. Michaels married in 1870, in Paris, Miss Amena Farrington, a lady of English descent, who died in 1903. He is survived by two daughters and one son, who is a practicing dentist in Paris.

DR. ANGUS V. ROSE.

Died at Syracuse, N. Y., March 10, 1912, of accidental asphyxiation, in his twenty-eighth year, Angus V. Rose, D.D.S.

As a victim of science, while trying to discover an ideal mixture of anesthetics, Dr. Angus V. Rose was accidentally asphyxiated in his office in Syracuse, N. Y., on March 10, 1912.

Dr. Rose was born in Picton, Ont., on January 15, 1885. After having moved to Syracuse in 1898, he decided to make dentistry his life-work, and began to perfect his preliminary education by untiring night study, finally passing successfully the examinations at the Central high school of that city. He thereupon matriculated in the Philadelphia College of Dental Surgery, from which institution he was graduated with the degree of D.D.S. in 1906. He returned to Syracuse, where he established a most successful dental practice. Ever bent upon increasing his knowledge, he became one of the most diligent members of the Dr. Wedelstaedt Dental Study Club, composed of Syracuse dentists. His special aim was the improvement of modern methods of general anesthesia, and, after securing a Teter machine, he took up experiments with a mixture of nitrous oxid, oxygen, chloroform, and peppermint. His researches had proved so successful that he intended to give a demonstration of his results at the prospective May meeting of the New York State Dental Society. While experimenting alone in his office, he was accidentally asphyxiated, all efforts at resuscitation failing to restore life. Dr. Rose had suggested several improvements in the Teter machine, and had also perfected a casting machine and a swaging device.

The deceased conducted a very successful practice, and enjoyed the highest respect of the community and his professional friends who, but for his tragic end, expected great things from their *confrère*.

Dr. Rose was a prominent Mason, being a member of the central city bodies. He is survived by a widow, *née* Beatrice Amonson of Philadelphia, Pa.

The high esteem in which the deceased was held by the dental profession is evinced by the following *in memoriam* resolutions, passed by the Syracuse Dental Society:

Whereas, it has pleased Almighty God to remove from our midst by death our esteemed associate, Dr. Angus V. Rose, who entered into life eternal March 10, 1912; and

Whereas, although one of the younger members of the profession, by his death this society loses a most earnest and respected member and the profession an able and progressive worker; therefore be it

Resolved, That we, the Syracuse Dental Society, feeling keenly the loss we have sustained, hereby express our sorrow at the sudden termination of the career of Dr. Angus V. Rose, and that this society hereby extends to the members of his immediate family its sincere sympathy; and be it further

Resolved, That a copy of these resolutions be spread upon the minutes of this society, and that a copy thereof be sent to his widow and to the dental journals for publication.

G. S. Roth,
A. R. Cooke,
A. F. Smith,
Committee.

Brief Necrology.

Dr. J. E. Adkins of Hillsboro, Oregon, on February 22, 1912, of apoplexy.

Dr. George W. Stevens of New York, N. Y., on March 10, 1912, in his seventy-eighth year.

Dr. N. A. Hauge of Newark, Ill., on March 8, 1912, following a surgical operation, in his forty-fifth year.

Dr. Frank H. Newton of Kansas City, Kans., on February 25, 1912, of heart failure, in his fifty-fifth year.

Dr. Eugene Albert Klock of East New York, N. Y., on March 12, 1912, of heart failure, in his sixty-second year.

Dr. James W. Moriarty of Charlestown, Mass., on February 11, 1912, of paralysis, in his forty-fifth year. Deceased was a graduate of the Harvard Dental School.

Dr. WALTER S. BARNES of Pomona, Cal., on March 3, 1912. Deceased had practiced dentistry for over thirty years in Washington, D. C.

Dr. JAMES G. MACCONAGHY of Cannes and Boulogne, France, on January 31, 1912, of pneumonia, in his sixty-first year. Deceased was born in Toronto, Canada.

Dr. WILLIAM E. BLAIR of Ransom, Ill., on March 7, 1912, following a surgical operation, in his thirty-fourth year. Deceased was a graduate of the Chicago College of Dental Surgery.

Dr. FRED L. FARRINGTON of Lowell, Mass., on January 25, 1912, of interstitial nephritis, in his fifty-second year. Deceased was a member of the Lowell Dental Society.

Dr. WILLIAM A. GRAHAM of Madison, Ind., on February 15, 1912, of apoplexy, in his seventy-second year. Deceased was a graduate of the Ohio College of Dental Surgery, Cincinnati.

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SOCIETY NOTES AND ANNOUNCEMENTS.

DENTAL SOCIETY MEETINGS:

May, June, and July.

MAY.

ILLINOIS STATE DENTAL SOCIETY. Springfield. Four days: May 14th to 17th.

INDIANA STATE DENTAL ASSOCIATION. Indianapolis. Three days: May 21st to 23d.

IOWA STATE DENTAL SOCIETY. Des Moines. Four days: May 7th to 10th.

KENTUCKY STATE DENTAL ASSOCIATION. Louisville. Three days: May 27th to 29th.

LAKE ERIE (PA.) DENTAL ASSOCIATION. Cambridge Springs. Three days: May 23d to 25th.

LEBANON VALLEY (PA.) DENTAL ASSOCIATION. Lebanon. Two days: May 14th and 15th.

MASSACHUSETTS DENTAL SOCIETY. Boston. Three days: May 2d to 4th.

NATIONAL DENTAL PROTECTIVE ASSOCIATION. Washington, D. C. May 21st.

NEBRASKA STATE DENTAL SOCIETY. Lincoln. Three days: May 21st to 23d.

NEW YORK STATE DENTAL SOCIETY. Albany. Three days: May 9th to 11th.

NORTH DAKOTA DENTAL ASSOCIATION. Grand Forks. Two days: May 7th and 8th.

SOUTH DAKOTA STATE DENTAL SOCIETY. Sioux Falls. Two days: May 14th and 15th.

SOUTHERN CALIFORNIA DENTAL ASSOCIATION. Los Angeles. Three days: May 6th to 8th.

SUSQUEHANNA (PA.) DENTAL ASSOCIATION. Wilkes-Barre. Three days: May 21st to 23d.

TEXAS STATE DENTAL ASSOCIATION. Abilene. Three days: May 2d to 4th.

VERMONT STATE DENTAL SOCIETY. Burlington. Three days: May 15th to 17th.

WASHINGTON UNIVERSITY DENTAL SCHOOL ALUMNI ASSOCIATION. St. Louis. May 6th and 7th.

JUNE.

ALABAMA DENTAL ASSOCATION. Tascaloosa. Four days: June 11th to 14th.

AMERICAN MEDICAL ASSOCIATION, SECTION ON STOMATOLOGY. Atlantic City. June 4th to 7th.

ARKANSAS STATE DENTAL ASSOCIATION. Little Rock. Three days: June 19th to 21st.

CANADIAN DENTAL SOCIETY AND ONTARIO DENTAL ASSOCIATION. Hamilton, Ont. Four days: June 3d to 6th.

COLORADO STATE DENTAL ASSOCIATION. Colorado Springs. Three days: June 20th to 22d.

GEORGIA STATE DENTAL SOCIETY. Americus. Three days: June 11th to 13th.

MAINE DENTAL SOCIETY. Bar Harbor. Three days: June 26th to 28th.

MINNESOTA STATE DENTAL ASSOCIATION. St. Paul. Two days: June 14th and 15th.

MISSISSIPPI DENTAL ASSOCIATION. Gulfport. Three days: June 4th to 6th.

NEW HAMPSHIRE DENTAL SOCIETY. Weirs. Three days: June 19th to 21st.

PENNSYLVANIA STATE DENTAL SOCIETY. Pittsburgh. Three days: June 11th to 13th.

SOUTH CAROLINA STATE DENTAL ASSOCIATION. Charleston. Three days: June 18th to 20th.

Southern Wisconsin Dental Association. Delavan. June 6th and 7th.

Tennessee State Dental Association. Memphis. Three days: June 6th to 8th.

Tri-Society (N. J.) Exhibition and Convention. Atlantic City. Three days: June 19th to 21st.

Utah State Dental Society. Ogden. Two days: June 3d and 4th.

JULY.

American Society of Orthodontists. Chicago, Ill. July 1st to 3d.

North Carolina State Dental Society. Raleigh. Four days: July 3d to 6th.

Nova Scotia Dental Association. Halifax. July 11th and 12th.

Virginia State Dental Association. Old Point Comfort. Three days: July 9th to 11th.

Examiners' Meetings.

Alabama Board of Examiners. Tuscaloosa. June 10th.

Arkansas Board of Examiners. Little Rock. June 17th and 18th.

Connecticut Dental Commissioners. Hartford. June 27th to 29th.

Florida Board of Examiners. Jacksonville. May 25th and 27th to 29th.

Idaho Board of Examiners. Boise. July 1st.

Illinois Board of Examiners. Chicago. June 13th.

Indiana Board of Examiners. Indianapolis. June 10th to 15th.

Iowa Board of Examiners. Iowa City. June 3d.

Maryland Board of Examiners. Baltimore. May 30th and 31st.

Michigan Board of Examiners. Ann Arbor. June 17th to 22d.

Montana Board of Examiners. Helena. July 8th to 11th.

New Jersey Board of Registration. Trenton. June 24th to 26th.

North Carolina Board of Examiners. Raleigh. July 1st.

North Dakota Board of Examiners. Fargo. July 9th to 11th.

Pennsylvania Board of Examiners. Philadelphia and Pittsburgh. June 19th to 22d.

Rhode Island Board of Registration. Providence. June 25th to 27th.

South Carolina Board of Examiners. Columbia. June 25th.

South Dakota Board of Examiners. Sioux Falls. July 9th.

Texas Board of Examiners. Houston. June 10th.

Vermont Board of Examiners. Montpelier. July 1st to 3d.

Virginia Board of Examiners. Richmond. June 11th.

West Virginia Board of Examiners. Wheeling. June 12th to 14th.

Wisconsin Board of Examiners. Milwaukee. June 24th.

CHAPIN A. HARRIS MEMORIAL FUND.

The committee appointed by the Maryland State Dental Association in charge of the Chapin A. Harris Memorial Fund call your attention to the desire on the part of the dental profession to commemorate in a suitable manner their appreciation of the services rendered by this distinguished man in the effort to elevate the profession of dentistry.

While not a Marylander by birth, his lifework was accomplished in this state, which was his home, and it was in the city of Baltimore that he established the first dental school, thus making dentistry a profession.

Connecticut has recognized and honored the name of Horace H. Hayden, a co-worker with Harris, by erecting a handsome monument to his memory at Windsor.

We are now asking contributions from dental societies, colleges, and members of the profession at large, to aid in erecting a suitable monument to the memory of Chapin A. Harris, the Founder of Professional Dentistry.

Those wishing to contribute will kindly send to Dr. H. A. Wilson, treasurer, Calvert Bank Bldg., Baltimore, Md.

W. G. Foster, *Chairman,*
W. W. Dunbracco, *Sec'y,*
M. G. Sykes,
B. Holly Smith,
T. O. Heatwole,
J. W. Smith,
H. A. Wilson, *Treas.*

AMERICAN SOCIETY OF ORTHODONTISTS.

The twelfth annual meeting of the American Society of Orthodontists will be held in Chicago, Ill., Monday, Tuesday, and Wednesday, July 1, 2, and 3, 1912.

Frederick C. Kemple, *Sec'y*,
576 Fifth ave., New York, N. Y.

INSTITUTE OF DENTAL PEDAGOGICS.

At the last meeting of the Institute of Dental Pedagogics the executive board decided to hold the next annual meeting in Pittsburgh, January 28, 29, and 30, 1913.

Officers elected: Dr. H. Edmund Friesell, 1206 Highland Bldg., Pittsburgh, Pa., president; Dr. D. H. Squire, Buffalo, N. Y., vice-president; Dr. Fred W. Gethro, 917 Marshall Field Bldg., Chicago, Ill., secretary-treasurer.

Fred W. Gethro, *Sec'y*.

NATIONAL DENTAL ASSOCIATION.

Manufacturers' Exhibit.

The manufacturers' exhibit during the convention of the National Dental Association in Washington, September 10 to 13, 1912, inclusive, will be held in the New Ebbitt Hotel, which is just across the street from the headquarters and the clinics. Specifications, plans, rates, and full information can be had by addressing

Clyde M. Gearhart, *Ch'man Exhibit Com.*,
1616 I st., N. W., Washington, D. C.

Notice from Clinic Committee.

The Clinic Committee desires to extend to all members in good standing of all dental societies a cordial invitation to attend and to clinic at the "all-day" clinic of this association, to be held at the New Willard Hotel, Washington, D. C., Friday September 13th. The enormous ballroom, top floor of this hotel, has been secured, and the management promises us every convenience.

We call your attention to the classification of the clinical material. Every effort will be made to arrange the different events according to title and in sequence, so that the various steps in the operation may be seen at a glance, without the usual regard to chair or table. This will avoid confusion and save time, allowing the members to select and study favorite subjects without hunting all over the room.

From the material now in hand the committee can promise a large and varied clinic. In order that we may assemble all clinicians' names and titles for the preliminary program, kindly reply at once to the chairman.

C. J. Grieves, *Chairman*, Park ave. and Madison st., Baltimore, Md.

A. O. Ross, *Vice-chairman*, 807 N. High st., Columbus, Ohio.

S. W. Bowles, *Secretary*, 1616 I st., Washington, D. C.

W. R. Clack, Mason City, Iowa.
A. P. Burkhart, Auburn, N. Y.
J. T. McClenahan, Washington, D. C.
W. D. Tracy, New York, N. Y.
George E. Savage, Worcester, Mass.
John H. McClure, Wheeling, W. Va.
J. E. Chace, Ocala, Fla.
E. L. Pettibone, Cleveland, Ohio.
H. J. Allen, Washington, D. C.
W. R. Wright, Jackson, Miss.
C. A. Lundy, Los Angeles, Cal.
S. H. McAfee, New Orleans, La.
C. M. Barnwell, Atlanta, Ga.
Richard L. Simpson, Richmond, Va.
W. H. Scherer, Houston, Texas.

Notice from Publicity Committee.

The dental educational series, now running in the newspapers in Illinois and Indiana, has been accepted by the Western Newspaper Union, 521 West Adams st., Chicago, as a part of their regular service. They are fully equipped to handle this matter expeditiously.

All advance orders that have been sent to me will be filled by the Western Newspaper Union as soon as shipping arrangements are completed for the different states. As this work has now passed into their hands, any correspondence should be addressed to them.

C. B. Warner, *Chairman*, Urbana, Ill.

NATIONAL DENTAL PROTECTIVE ASSOCIATION.

The annual meeting of the National Dental Protective Association will be held at the Fredonia Hotel, Washington, D. C., May 21, 1912, at 7.30 p.m., for the election of trustees and the transaction of business.

Richard Summa, *President*,
M. F. Finley, *Sec'y*.

AMERICAN MEDICAL ASSOCIATION.

Section on Stomatology.

FOLLOWING is the program of the Section on Stomalology, for the meeting of the American Medical Association, at Atlantic City, June 4–7, 1912:

1. "Oral Surgery and Its Relationship to General Medicine." (Chairman's Address.) S. L. McCurdy, Pittsburgh, Pa.
2. "The History, Object, and Success of the Oral Hygiene Movement." Richard Grady, Annapolis, Md.
3. "Wanted: A Sense of Asepsis." John S. Marshall, Berkeley, Cal.
4. "Mouth Cleanliness." M. H. Fletcher, Cincinnati, Ohio.
5. "Some Hygienic Errors of Dentists." L. G. Noel, Nashville, Tenn.
6. "The Care of the Mouths of the Sick." W. C. Fisher, New York, N. Y.
7. "Extra-Oral Bilateral Resection of the Mandible, Posterior to the Second Molar, for the Correction of Prognathism." W. Harsha, Chicago, Ill., and Jos. Eisenstaedt, Chicago, Ill.
8. "Acute Osteomyelitis of the Lower Jaw." W. Wayne Babcock, Philadelphia, Pa.
9. "Blind Abscesses." M. L. Rhein, New York, N. Y.
10. "Infections of the Upper and Lower Jaw." Fred. V. Hussey, Providence, R. I.
11. "The Hospital's Need of a Dental Staff." Andrew J. Flanagan, Springfield, Mass.
12. "The Cubical Contents and Superficial Area of the Maxillary Sinuses." Virgil Loeb, St. Louis, Mo.
13. "The Pathological Findings of Some Diseases of the Teeth and Gums." Vida A. Latham, Chicago, Ill.
14. "Saliva in Its Relation to the Hardening and Softening of Tooth Enamel." Joseph Head, Philadelphia, Pa.
15. "The Reciprocal Influences of Morbid Conditions of the Mouth, the Jaws, and the General Economy." M. I. Schamberg, New York, N. Y.
16. "The Speech Relation of Cleft Palate Operations." Geo. V. I. Brown, Milwaukee, Wis.
17. "Iodo-glycerol in the Treatment of Bone Infection." Eugene S. Talbot, Chicago, Ill.

All those interested in this program are cordially invited to attend and take part in the discussion.

STEWART L. MCCURDY, *Chairman*,
EUGENE S. TALBOT, *Sec'y*.

ASSOCIATION INTERNATIONALE DE PERFECTIONNEMENT SCIENTIFIQUE.

NINTH CONGRESS.

THE Ninth Annual Congress of the Association Internationale de Perfectionnement Scientifique (A. P. M.), under the patronage of the French government, will be held from August 3 to 31, 1912, in the Balkan States, Turkey, and Greece.

The Congress will be opened in Evian-les-Bains or Thonon-les-Bains (Lake of Geneva), and will proceed in the following order: Venice (via Simplon), Trieste, Adelsberg Caves, Agram, Belgrade, Danube Rapids, Kasan Defile, Iron Gate, Bucharest, Sophia, Constantinople, Mytilene, Smyrna, Athens, Phalerum, Eleusis, Corinth, Olympia, Corfu, Bologna (via Brindisi). The last meeting will be held at Aix-les-Bains.

Those wishing to present papers or reports on subjects pertaining to general or special medicine and surgery and allied sciences, hygiene in all its branches, prophylaxis, and charity, are requested to notify the central office.

The program of the congress will be published in the January issue of the Association's *Review*. A copy of this special number will be forwarded on application, if accompanied with a money order for 1s. 4d.

For further particulars address the president, Main Office A. P. M., 12 Rue François-Millet, Paris XVI, inclosing 2½d. in international return postage, or call at the office Wednesday or Saturday between 3 and 4 P.M.

DR. GHISLAIN HOUZEL, *Sec'y-general.*

LAKE ERIE (PA.) DENTAL ASSOCIATION.

THE forty-ninth annual meeting of Lake Erie Dental Association will be held at Hotel Bartlett, Cambridge Springs, Pa., May 23, 24, and 25, 1912.

C. L. MEAD, *Sec'y*,
Union City.

OKLAHOMA ORAL HYGIENE SOCIETY.

The purpose of this organization is to spread the propaganda of Oral Hygiene all over the state by a system of lectures throughout the rural districts as well as in the city schools. The ultimate result is to have the subject taught in the schools by placing this branch in the common school curriculum. There is no membership fee charged; every human being can become a member of this society. This movement is indorsed by all educators.

* * * * *

This organization was incorporated Thursday, March 28, 1912, and secured a membership of over five hundred in less than a week's time. By June 1st we intend to have a membership of more than five thousand. Our place of meeting will be in Oklahoma City, Okla. Literary contributions and donations in cash should be sent to Miss Libby Goldman, Secretary-treasurer, care Lee-Huckins Hotel, Oklahoma, Okla.

Respectfully,
Geo. W. Bowling.

NORTH DAKOTA DENTAL ASSOCIATION.

Note Change of Date.

The seventh annual meeting of the North Dakota Dental Association will be held at Grand Forks, N. D., May 7 and 8, 1912.

E. N. Hegge, *Sec'y*,
Hatton, N. D.

SOUTH DAKOTA STATE DENTAL SOCIETY.

The thirtieth annual meeting of the South Dakota State Dental Society will be held at Sioux Falls, May 14 and 15, 1912. Adoption of a new constitution and by-laws will take place at this meeting.

J. D. Donahoe, *Sec'y*,
Sioux Falls, S. D.

SOUTHERN CALIFORNIA DENTAL ASSOCIATION.

The fifteenth annual meeting of the Southern California Dental Association will be held in Los Angeles, Cal., May 6, 7, and 8, 1912, at the Dental Department of the University of Southern California.

Note that the date and place of meeting coincide with those of the Imperial Council of the Mystic Shrine. Clinics and papers will be given by dental surgeons of national reputation.

W. W. Mungen, *Chairman*.

VERMONT STATE DENTAL SOCIETY.

The next meeting of the Vermont State Dental Society will be held at Hotel Vermont, Burlington, Vt., May 15 to 17, 1912. The opening session, Wednesday, May 15th, will be at 2.30 p.m.

Harry F. Hamilton, *Sec'y*,
Newport, Vt.

LEBANON VALLEY (PA.) DENTAL ASSOCIATION.

The next annual meeting of the Lebanon Valley Dental Association will be held on Tuesday and Wednesday, May 14 and 15, 1912, at Lebanon, Pa.

John T. Bair, *Corresponding Sec'y*,
Reading, Pa.

MASSACHUSETTS DENTAL SOCIETY.

The forty-eighth annual meeting of the Massachusetts Dental Society will be held at the Harvard Dental School, in Boston, Mass., May 2 to 4, 1912.

Waldo E. Boardman,
Boston, Mass.

NEBRASKA STATE DENTAL SOCIETY.

The thirty-sixth annual meeting of the Nebraska State Dental Society will be held in Lincoln, Neb., May 21, 22, and 23, 1912. The Lindell hotel will be the headquarters, the clinics being held in the auditorium. We are looking forward to the best meeting in our history. The following men from out of the state will appear on the program:

Dr. C. M. McCauley, Abilene, Texas—a paper and clinic on "Amalgam."

Dr. C. G. Myers, Cleveland, Ohio—"High Pressure Anesthesia."

Dr. Chas. Woodbury, Council Bluffs, Iowa —"Indications for Gold Inlay and for the Foil Filling."

Dr. Horace Warren, Missouri Valley, Iowa, will conduct a campaign for the public on "Oral Hygiene."

All ethical practitioners are invited to attend the meeting.

C. C. Farrell, *Pres.*,
Cozad, Nebr.
J. H. Wallace, *Sec'y*,
Omaha, Neb.

NEW YORK STATE DENTAL SOCIETY.

The forty-fourth annual meeting of the New York State Dental Society will be held at Albany, N. Y., in the Hotel Ten Eyck, May 9, 10, and 11, 1912.

Program.

"Filling Root-canals with an Improved Paraffin Compound." (Illustrated by Lantern Slides and Demonstrations.) Hermann Prinz, M.D., D.D.S., St Louis, Mo.

"Failures in Crown and Bridge Work—Their Cause and Cure." A. W. Thornton, D.D.S., Toronto, Can.

"An Inquiry into the Relation of Potassium Sulfocyanate to Dental Caries." Wm. J. Gies, M.D., Ph.D., New York, N. Y.

Report of the Correspondent. C. B. Prentiss, D.D.S.

Report of the Scientific Research Committee. W. B. Dunning, D.D.S.

Report of the Committee on Practice. F. P. Hamlet, D.D.S.

The Clinic Committee will unquestionably present a fine list of clinics. (No clinics honored after March 20, 1912.) A special effort in behalf of exhibitors—for their comfort and sufficient space for exhibits—will be made by the Exhibit Committee. Address at once Dr. O. J. Gross, Schenectady, N. Y.

A cordial invitation is extended to all ethical dentists. Reduced rates on the certificate plan have been secured from points in New York, New Jersey, and Pennsylvania.

A. P. Burkhart, *Sec'y*,
52 Genesee st., Auburn, N. Y.

INDIANA STATE DENTAL ASSOCIATION.

The fifty-fourth annual meeting of the Indiana State Dental Association will be held at the Claypool Hotel, Indianapolis, Ind., May 21, 22, and 23, 1912.

W. W. Shryock, supervisor of clinics, promises the greatest clinic ever held in the state. W. E. Kennedy, executive committeeman, has already perfected a grand program, having secured the promise of papers from some of the best men in the dental profession. Carl Lucas, master of exhibits, has already almost the entire eighth floor of the Claypool Hotel reserved by the dental exhibitors.

This meeting will go down in the history of the association as a landmark, because of the large number of new members—our slogan "1000 members in 1912."

No dentist or exhibitor who wants to attend one of the very best meetings that will be held in 1912 can afford to miss the Indiana State dental meeting this year. You will be welcome.

Otto U. King, *Sec'y*,
Huntington, Ind.

IOWA STATE DENTAL SOCIETY.

Golden Anniversity.

The fiftieth annual meeting of the Iowa State Dental Society will convene at Des Moines, Iowa, May 7, 8, 9, and 10, 1912, beginning Tuesday, May 7th, at 9 A.M.

The Coliseum, with its large floor space, has been secured for clinics, exhibits, and lectures.

A special effort is being made to have all the old members who are alive present, and Thursday will be given over to the older dentists and ex-Iowa practitioners as a homecoming event, to exhibit, lecture, clinic, and banquet, and all are urged to attend. An historical paper is being prepared by Dr. J. B. Monfort of Fairfield, and pictures of early practitioners will be shown. This we expect to be one of our most interesting days.

The exhibits will be the largest ever given by any state society. Complete and extensive modern dental equipments, appliances, and instruments will be shown and demonstrated, and in contrast a large exhibit will be made of equipment, appliances, instruments, etc., of fifty years ago, that will be highly interesting and educational, and will be in charge of Dr. A. D. Clark of Charles City, Iowa, who would be pleased to correspond with anyone who might add to this exhibit. The modern exhibits will be in charge of Dr. H. A. Elmquist, master of exhibits, Des Moines, Iowa, to whom application for space should be made at an early date.

Further information will be furnished upon request from ethical practitioners of other states contemplating a visit to the meeting, to whom we extend a cordial invitation.

C. M. Kennedy, *Sec'y*,
605 Citizen's Nat'l Bank,
Des Moines, Iowa.

TEXAS STATE DENTAL ASSOCIATION.

The thirty-second annual meeting of the Texas State Dental Association will be held at Abilene, Texas, May 2, 3, and 4, 1912. Exhibitors desiring space will please address Dr. C. M. McCauley, Abilene, Texas. The clinics will be in charge of Dr. J. O. Hall, Waco, Texas, who will furnish any information relative to the same.

All ethical practitioners are cordially invited to attend the meeting, and will be cheerfully furnished any other information by the secretary.

H. M. Davison, *President*,
Hubbard, Texas.
J. G. Fife, *Sec'y*,
736 Wilson Bldg., Dallas, Texas.

SUSQUEHANNA DENTAL ASSOCIATION OF PENNSYLVANIA.

The forty-ninth annual meeting of the Susquehanna Dental Association of Pennsylvania will be held at Irem Temple, Wilkes-Barre, Pa., Tuesday, Wednesday, and Thursday, May 21, 22, and 23, 1912.

Executive Commitee—A. E. Bull, Wilkes-Barre, chairman, T. W. Thomas, W. E. Davis, B. C. Courtright, A. J. Hefferman, and A. B. Miller. For information address the chairman.

All ethical practitioners are invited to attend, and all ethical dentists of Pennsylvania are eligible to membership.

Edmond J. Donnegan, *Rec. Sec'y*,
Scranton, Pa.

KENTUCKY STATE DENTAL ASSOCIATION.

The meeting of the Kentucky State Dental Association will be held in Louisville, May 27, 28, and 29, 1912. A special attraction, consisting of talented men from out of the state, will be upon the program this year, and every indication points to the best state meeting that has been held for many years. The dentists in Kentucky are especially invited and a special invitation is extended to all ethical members of the profession.

W. M. Randall, *Sec'y*,
Louisville, Ky.

WASHINGTON UNIVERSITY DENTAL SCHOOL.

Alumni Association.

The annual clinic and reunion of graduates will be held under the auspices of the Alumni Association of Washington University Dental School, May 6 and 7, 1912, at the college building, Twenty-ninth and Locust sts., St. Louis, Mo. (The former dates of April 22d and 23d, first decided upon for the meeting, were changed to enable our fellow alumnus, Dr. G. V. Black of Chicago, to attend as guest of honor.)

This meeting promises to be unusually interesting, both in the way of papers and clinics, and all graduates should make a special effort to be present. All ethical dentists are invited to attend.

R. A. Harris,
E. A. Woelk,
F. E. Meyer,
Publicity Committee.

CHICAGO COLLEGE OF DENTAL SURGERY.

Alumni Association.

The annual meeting and clinic of the Alumni Association of the Chicago College of Dental Surgery will be held in the college building, on Monday and Tuesday, June 3 and 4, 1912. This meeting is to be a home-coming for all the graduates of the college, as well as for all ethical practitioners. Mark the dates now on your appointment book and plan to come.

H. C. Peisch, *Sec'y*.

ILLINOIS STATE DENTAL SOCIETY.

The forty-seventh annual meeting of the Illinois State Dental Society will be held at Springfield, May 14, 15, 16, and 17, 1912.

J. F. F. Waltz, *Sec'y*,
Decatur, Ill.

SOUTHERN WISCONSIN DENTAL ASSOCIATION.

The eighteenth annual meeting of the Southern Wisconsin Dental Association will be held at Highland Park, Delavan, Lake Delavan, Wis., June 6 and 7, 1912. All ethical members of the profession are cordially invited to attend.

C. W. Collver, *Sec'y*.

PENNSYLVANIA STATE DENTAL SOCIETY.

The forty-fourth annual meeting of the Pennsylvania State Dental Society will be held in Carnegie Music Hall, Pittsburgh, June 11, 12, and 13, 1912. A program of exceptional interest is being prepared.

Luther M. Weaver, *Recording Sec'y*.

GEORGIA STATE DENTAL SOCIETY.

The forty-fourth annual meeting of the Georgia State Dental Society will be held at Americus, Ga., June 11, 12, and 13, 1912.

Instructive papers have been secured and the Clinic Committee will unquestionably present a fine list of clinics. A cordial invitation is extended to all ethical dentists.

M. M. Forbes, *Sec'y*,
810-11 Candler Building, Atlanta, Ga.

ALABAMA DENTAL ASSOCIATION.

The forty-third annual meeting of the Alabama Dental Association will be held in Tuscaloosa, Ala., June 11, 12, 13, and 14, 1912. Instructive papers have been secured, and the Clinic Committee will unquestionably present a fine list of clinics.

A cordial invitation is extended to all ethical dentists.

G. F. Petrey, *Sec'y*,
Florala, Ala.

UTAH STATE DENTAL SOCIETY.

The twenty-first annual meeting of the Utah State Dental Society will be held at Ogden, Utah, June 3 and 4, 1912.

W. G. Dalrymple, *Sec'y*.

MAINE DENTAL SOCIETY.

The forty-seventh annual meeting of the Maine Dental Society will be held at the Newport House, Bar Harbor, Me., June 26, 27, and 28, 1912.

I. E. Pendleton, *Sec'y*.

MISSISSIPPI DENTAL ASSOCIATION.

The thirty-seventh annual meeting of the Mississippi Dental Association will be held at Gulfport, Miss., June 4, 5, and 6, 1912. All ethical practitioners are cordially invited to attend and take part in the meeting. Dr. A. J. Price of Gulfport, will have charge of the clinics, and will furnish any information as to same.

L. B. Price, *Sec'y*,
Corinth, Miss.

SOUTH CAROLINA STATE DENTAL ASSOCIATION.

The forty-second annual meeting of the South Carolina State Dental Association will be held at the Isle of Palms, Charleston, S. C., June 18, 19, 20, 1912.

Dr. R. Atmar Smith, Charleston, S. C., is chairman of the Arrangement Committee. Programs will be mailed on June 10th. All ethical dentists are cordially invited.

W. Busey Simmons, *Recording Sec'y*,
Piedmont, S. C.

TENNESSEE STATE DENTAL ASSOCIATION.

The forty-fifth annual meeting of the Tennessee State Dental Association will be held at Memphis, Tenn., in the Business Men's Club rooms, June 6, 7, and 8, 1912.

The Business Men's Club extends the courtesies of the club to all the visiting dentists, and the association invites all ethical dentists to attend.

Chas. A. Tavel, *Pres.*,
J. L. Manire, *Sec'y*.

CANADIAN DENTAL SOCIETY AND ONTARIO DENTAL ASSOCIATION.

Union Meeting.

A union meeting of the Canadian Dental Society and Ontario Dental Association will be held at Hotel Brant, Hamilton, Ont., June 3, 4, 5, and 6, 1912.

J. A. C. Hoggan.

NEW HAMPSHIRE DENTAL SOCIETY.

The annual meeting of the New Hampshire Dental Society will be held at Hotel Weirs, Weirs, N. H., June 19, 20, and 21, 1912. All members of the profession are cordially invited to be present.

Fred F. Fisher, *Sec'y*,
Manchester, N. H.

ARKANSAS STATE DENTAL ASSOCIATION.

The next meeting of the Arkansas State Dental Association will be held in Little Rock, Ark., June 19, 20, and 21, 1912.

Every effort will be made to make it more interesting, more instructive, and more entertaining than ever before; each individual, by his support, can materially assist in this desired result.

Irvin N. Sternberg, *Sec'y*,
Fort Smith, Ark.

MINNESOTA STATE DENTAL ASSOCIATION.

The twenty-ninth annual meeting of the Minnesota State Dental Association, which will be held in St. Paul, Minn., June 14 and 15, 1912, promises to be the largest in the history of the organization. The large clinic and manufacturers' exhibit will occupy the entire top floor of the new Lowry Building, the largest and best equipped dental and medical building in the West.

At that time of the year the Twin Cities, with their wealth of parks and beautiful lakes, afford an ideal spot for a vacation, and the business and instruction of the meeting may well be combined with the recreation so necessary to our profession.

For information address

Benjamin Sandy, *Sec'y*,
636 Syndicate Bldg., Minneapolis, Minn.

COLORADO STATE DENTAL ASSOCIATION.

The twenty-sixth annual meeting of the Colorado State Dental Association will be held at Colorado Springs, June 20, 21, and 22, 1912. Dr. A. W. Starbuck, Colorado College of Dental Surgery, Denver, Colo., will have complete charge of clinics; he will gladly furnish any information relative to the same. Exhibitors desiring space will please address the secretary.

All ethical practitioners are cordially invited to attend this meeting. Any information desired will be cheerfully furnished.

H. F. Hoffman, *President*,
324 Metropolitan Bldg., Denver, Colo.
Chas. A. Monroe, *Sec'y*,
Boulder, Colo.

TRI-SOCIETY (N. J.) EXHIBITION AND CONVENTION.

Change of Place of Meeting.

A tri-society (N. J.) dental exhibition and convention will be held in Atlantic City, N. J., June 19 to 21, 1912. The three societies entering into the arrangement are the Southern Dental, the Mercer, and the Atlantic County. The official designation is—"Second Annual Convention under the auspices of the Southern, Mercer, and Atlantic Dental Societies."

Notwithstanding the fact that Young's Old Pier, Atlantic City, on March 29th, was damaged to an extent entailing $200,000 loss, the above-named societies will hold their convention and exhibit in Atlantic City, as arranged. It was announced in March that both the convention and exhibit would be held at the Old Pier, but it having just been ascertained that contemplated repairs cannot be made by June 19th, the Executive Committee have contracted for the use of the famous Steel Pier located at Virginia ave. and the Boardwalk, hence all notices, arrangements and contracts relating to the convention and exhibit are being made to conform to the new location.

At a meeting of the Executive Committee held in Camden, Wednesday, February 28, 1912, a thorough outline of the work of the convention was prepared, including the appointment of all committees.

Dr. H. E. Friesell of Pittsburgh, Pa., Professor of Operative Dentistry, University of Western Pennsylvania, will read a paper on the subject of "Extension for Prevention;" Dr. C. S. Van Horn of Bloomsburg, Pa., will read a paper upon the subject, "The Wax Pattern"—a technique, together with appliance, etc., for its use. Two other papers which are being arranged for will be announced later.

The convention held at Young's Pier in 1911, by the Southern Dental and Atlantic County Societies, proved successful, and with the assistance of the Mercer Society the convention this year should prove to be an even greater success.

Walter W. Crate,
Ch'man Press Committee.

VIRGINIA STATE DENTAL ASSOCIATION.

The Virginia State Dental Association will meet at Old Point Comfort, Va., July 9, 10, and 11, 1912. All ethical practitioners are invited.

W. H. Pearson, *Corresp. Sec'y.*

NOVA SCOTIA DENTAL ASSOCIATION.

The annual meeting of the Nova Scotia Dental Association will be held in Dalhousie University building, Halifax, Thursday and Friday, July 11 and 12, 1912. The equipment of the dental department affords every facility for clinical demonstrations. A good program is being arranged.

Mark the dates off your appointment book now.

Wm. W. Woodbury, *Sec'y.*

NORTH CAROLINA DENTAL SOCIETY.

The thirty-eighth annual meeting of the North Carolina Dental Society will be held at Raleigh, N. C., in the Hall of the House of Representatives in the Capitol, July 3, 4, 5, and 6, 1912.

Instructive papers have been secured, and the Clinic Committee will unquestionably present a fine list of clinics. A cordial invitation is extended to all ethical dentists.

J. W. Stanly, *Sec'y,*
Wilmington, N. C.

FLORIDA BOARD OF EXAMINERS.

The annual meeting of the Florida State Board of Dental Examiners for the examination of applicants for licenses to practice in this state will be held in Jacksonville, Fla., May 25, 27, 28, and 29, 1912, beginning promptly at 9 o'clock on the morning of the 25th.

To be eligible to examination one must hold a diploma from a reputable dental school and furnish evidence of good moral character. Each applicant will be required to exhibit diploma and present a recent photograph of himself.

Practical work will consist of one gold and one amalgam filling in the mouth, one dowel crown and one upper or lower plate, to be set up and occluded to a model of natural teeth.

No interchange of licenses with any state.

W. G. Mason, *Sec'y,*
Tampa, Fla.

CONNECTICUT DENTAL COMMISSIONERS.

The Connecticut Board of Commissioners will meet on June 27, 28, and 29, 1912, at Hartford, Conn., to examine applicants for license to practice dentistry. Application blanks, rules, etc., will be forwarded by the recorder upon request.

D. Everett Taylor, *Recorder,*
Williamantic, Conn.

MARYLAND BOARD OF EXAMINERS.

The Maryland State Board of Dental Examiners will meet for examination of candidates for certificates, May 30 and 31, 1912, at the Dental Department of the Baltimore Medical College, at 9 a.m.

Candidates must pass a written examination in anatomy, physiology, chemistry, bacteriology, oral surgery, operative and prosthetic dentistry, pathology, therapeutics, and materia medica. The practical requirements consist of the insertion of one gold and one amalgam filling in the mouth, and the submission of a metal plate or bridge of not less than four crowns—two of which shall be of porcelain—the parts being assembled and invested in advance and soldered in the presence of the board. Applications, accompanied by the fee of ten dollars, must be filed with the secretary prior to May 30th. For application blanks or further information, apply to

F. F. Drew, *Sec'y,*
701 N. Howard St., Baltimore, Md.

RHODE ISLAND BOARD OF REGISTRATION.

The Rhode Island Board of Registration in Dentistry will meet for the examination of candidates at the State-house, Providence, R. I., Tuesday, Wednesday, and Thursday, June 25, 26, and 27, 1912. Application blanks and particulars may be obtained from

H. L. Grant, *Sec'y,*
1025 Banigan Bldg., Providence, R. I.

INDIANA BOARD OF EXAMINERS.

The next regular meeting of the Indiana State Board of Dental Examiners will be held in the State-house, Indianapolis, Ind., June 10 to 15, 1912. All applicants for examination and registration will be examined at this time; no other examination will be held before January 1913. No temporary permits are issued.

For further information apply to

F. R. Henshaw, *Sec'y,*
508 K. of P. Bldg., Indianapolis, Ind.

ALABAMA BOARD OF EXAMINERS.

The Alabama Board of Dental Examiners will meet in annual session in Tuscaloosa, Ala., on Monday, June 10, 1912, at 9 a.m.

Applicants for license must hold a diploma from a reputable dental college, and pass a written examination in operative dentistry, prosthetic dentistry, including metallurgy and oral surgery, orthodontia, pathology, histology, materia medica, chemistry, anatomy, physiology, and oral hygiene. Practical work: One approximal gold and one amalgam filling, constructing an anterior bridge of six teeth, using canines as abutments, Richmond crowns—all soldering to be done in presence of one or more members of the board. Examination fee $10.00.

W. E. Proctor, *Sec'y,*
Sheffield, Ala.

PENNSYLVANIA BOARD OF EXAMINERS.

The Pennsylvania State Board of Dental Examiners will hold their next regular examination in Philadelphia and Pittsburgh simultaneously on Wednesday, Thursday, Friday, and Saturday, June 19, 20, 21, and 22, 1912, the practical work being held on Wednesday. Application blanks can be secured from the Department of Public Instruction, Harrisburg.

Alexander H. Reynolds, *Sec'y,*
4630 Chester ave., Philadelphia.

MICHIGAN BOARD OF EXAMINERS.

The next regular meeting of the Michigan State Board of Dental Examiners will be held at the Dental College, Ann Arbor, Mich., commencing Monday, June 17, 1912, at 8 a.m., and continuing to the 22d inclusive.

For application blanks and full particulars address

F. E. Sharp, *Sec'y,*
Port Huron, Mich.

NEW JERSEY BOARD OF REGISTRATION.

The State Board of Registration and Examination in Dentistry will hold their semiannual meeting in the Assembly Chamber of the State-house at Trenton, N. J., June 24, 25, and 26, 1912; practical work on the 24th.

Applications must be on hand one week prior to the examination.

Charles A. Meeker, *Sec'y,*
29 Fulton st., Newark, N. J.

WISCONSIN BOARD OF EXAMINERS.

The Wisconsin State Board of Dental Examiners will convene in Milwaukee, Wis., at Marquette University, on Monday, June 24, 1912, at 9 a.m., for examination of applicants to practice in Wisconsin.

High-school diploma, applications, and $25.00 fee must be filed with the secretary fifteen days prior to above date. Dental diploma to be presented in advance of examination.

W. T. Hardy, *Sec'y,*
422 Jefferson st., Milwaukee, Wis.

IOWA BOARD OF EXAMINERS.

The next meeting of the Iowa State Board of Dental Examiners for the examination of applicants for licenses will be held at Iowa City, Iowa, commencing Monday, June 3, 1912.

J. A. West, *Sec'y*,
417 Utica Bldg., Des Moines, Ia.

WEST VIRGINIA BOARD OF EXAMINERS.

The West Virginia State Board of Dental Examiners will hold their regular examination, in Wheeling, W. Va., June 12, 13, and 14, 1912.

For information write

J. Fleetwood Butts, *Sec'y*,
Charleston, W. Va.

TEXAS BOARD OF EXAMINERS.

The next meeting of the Texas State Board of Dental Examiners, for the purpose of examining applicants for a license to practice dentistry and dental surgery in the State of Texas, will be held in Houston, Texas, beginning June 10, 1912, at 9 A.M.

For application blanks and any further information address

J. M. Murphy, *Sec'y*,
Temple, Texas.

ILLINOIS BOARD OF EXAMINERS.

The semi-annual meeting of the Illinois State Board of Dental Examiners for the examination of applicants for a license to practice dentistry in the state of Illinois will be held at the Northwestern University Dental School, corner Lake and Dearborn sts., Chicago, Ill., beginning Thursday, June 13, 1912, at 9 A.M.

The following preliminary qualifications are required of candidates to entitle them to examination by this board for a license to practice dentistry in the state of Illinois: Graduates of a reputable dental or medical school or college, or dental department of a reputable university, who enter the school or college as freshmen on or after the school year 1906–07, must have a minimum preliminary education of not less than graduation from an accredited high school or a certificate from the state superintendent of public instruction, equivalent officer or deputy acting within his proper or legal jurisdiction, showing that the applicant has an education equal to that obtained in an accredited high school; which certificate shall be accepted in lieu of a high-school diploma.

Candidates will be furnished with proper blanks and such other information as is necessary, on application to the secretary. All applications, together with the fees, twenty-six dollars, must be filed with the secretary at least five days prior to date of examination. The examination fee is twenty dollars; license fee five dollars; registration fee one dollar.

Address all communications to

T. A. Broadbent, *Sec'y*,
705 Venetian Bldg., Chicago, Ill.

VIRGINIA BOARD OF EXAMINERS.

The regular annual meeting of the Virginia State Board of Dental Examiners will be held in Richmond, Va., June 11, 1912, for the examination of applicants. Examinations will begin at 9 A.M.

For further information address

J. P. Stiff, *Sec'y*,
Fredericksburg, Va.

SOUTH CAROLINA BOARD OF EXAMINERS.

The South Carolina Board of Dental Examiners will meet in the city of Columbia. Tuesday, June 25, 1912, at 11 A.M. All applicants must register with the secretary on that day.

For further information address

J. M. Quattlebaum, *Sec'y*,
Columbia, S. C.

IDAHO BOARD OF EXAMINERS.

The next meeting of the Idaho State Dental Board for examinations will be held in Boise, Idaho, beginning July 1, 1912, at 9 A.M., at the Capitol building.

Albert A. Jessup, *Sec'y*.

NORTH CAROLINA BOARD OF EXAMINERS.

The next regular meeting of the North Carolina State Board of Dental Examiners will be held in Raleigh, N. C., July 1, 1912. For further necessary information address

F. L. Hunt, *Sec'y*,
Asheville, N. C.

VERMONT BOARD OF EXAMINERS.

The annual meeting of the Vermont State Board of Dental Examiners, for the examination of candidates for the practice of dentistry, will be held at the State-house, Montpelier, July 1, 2, and 3, 1912, commencing at 2 o'clock P.M., July 1st.

For application blanks and full particulars address

George F. Cheney, *Sec'y*,
St. Johnsbury, Vt.

ARMY DENTAL SURGEONS.

Memoranda of Changes.

For the week ending March 16, 1912:

First Lieut. Geo. E. Stallman, March 10th, returned to Fort Sam Houston, Texas, from duty at Fort Logan H. Roots, Ark.

For the week ending March 23d:

First Lieut. F. Homer Wolven, March 10th, reported for temporary duty at Fort Stevens, Ore.

First Lieut. Frank P. Stone, March 20th, left Fort McPherson, Ga., *en route* to Fort Morgan, Ala., for temporary duty.

For the week ending March 30th:

First Lieut. Frank P. Stone, March 22d, reports arrival at Fort Caswell, N. C., for temporary duty.

James F. Feely, C.D.S., March 26th, left from temporary duty at Fort McHenry, Md., *en route* to Fort Howard, Md., for temporary duty.

For the week ending April 6th:

First Lieut. J. R. Bernheim, March 31st, left Fort Sheridan, Ill., for duty on examining board at Columbus Barracks, Ohio.

James F. Feely, C.D.S., April 4th, left Fort Howard, Md., *en route* to Washington Barracks, D. C., for temporary duty.

For the week ending April 13th:

James F. Feely, C.D.S., April 4th, reports for temporary duty at Washington Barracks, D. C.

First Lieut. C. E. Lauderdale, April 8th, relieved from treatment at the Walter Reed General Hospital, D. C., and to return to station. Same date granted leave of absence for one month on surgeon's certificate of disability.

First Lieut. Frank P. Stone, April 10th, left from temporary duty at Fort Caswell, N. C., *en route* to Fort Moultrie, S. C., for temporary duty.

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UNITED STATES PATENTS

PERTAINING OR APPLICABLE TO DENTISTRY

ISSUED DURING MARCH 1912.

March 5.

No. 1,019,233, to Herbert Arthur Edwards. Manufacture of cased metal pins.

No. 1,019,519, to Oscar Martin Polin. Apparatus for making backings for artificial teeth.

No. 1,019,733, to Addison R. DePass. Means for protecting dental work.

March 12.

No. 1,019,994, to Heinrich Schweitzer. Swage machine.

No. 1,020,018, to Alexander Leprohon Bonin. Detachable tooth-brush.

March 26.

No. 1,021,065, to James Neil, Jr. Guard for dental instruments.

No. 1,021,527, to James W. Ivory. Dental hand porte-polisher.

No. 1,021,528, to James W. Ivory. Fastening for artificial tooth crowns.

No. 1,021,639, to Howard R. Smith. Mouth-mirror.

THE

DENTAL COSMOS.

VOL. LIV. JUNE 1912. No. 6.

ORIGINAL COMMUNICATIONS.

AMALGAMS CONTAINING TIN, SILVER, AND MERCURY.

By JAMES W. MCBAIN and R. A. JOYNER.

FROM THE CHEMICAL LABORATORIES OF THE UNIVERSITY OF BRISTOL, ENG.

THE object of the present investigation* is to ascertain the chemistry and physical chemistry of the ternary system—tin, silver, and mercury. Our knowledge of this system is as yet due entirely to empirical experience in dental practice and to isolated measurements, chiefly of changes in form and of crushing strength.

We have no clue to the reasons for uncontrollable differences in behavior of amalgams, and hence the elucidation of the chemical changes involved appeared not only interesting from the purely scientific point of view, but fundamentally necessary for further progress in this most important branch of dental metallurgy.

Before studying the more complicated system containing the three constituents, it was obviously necessary to complete our knowledge of three pairs of metals taken separately. Two of these systems, mercury-tin and mercury-silver, have been thoroughly and satisfactorily studied by other investigators (see later).* On the other hand, a thorough revision of previous work on the silver-tin alloys was necessitated.

SILVER-TIN ALLOYS.

Petrenko (*Zeitschr. anorg. Chem.*, 1907, vol. liii, p. 200) has studied the silver-tin alloys in Tammann's laboratory, applying the modern methods of thermal analysis and of photomicrography, and his is the most important and most recent work on the alloys in question. Evidently he was unaware of the dental literature bearing on the subject, for he confined his attention chiefly to the alloys containing a very high percentage (more than 75) of silver, while the dental alloys contain between 40 and 70 per cent. of silver.

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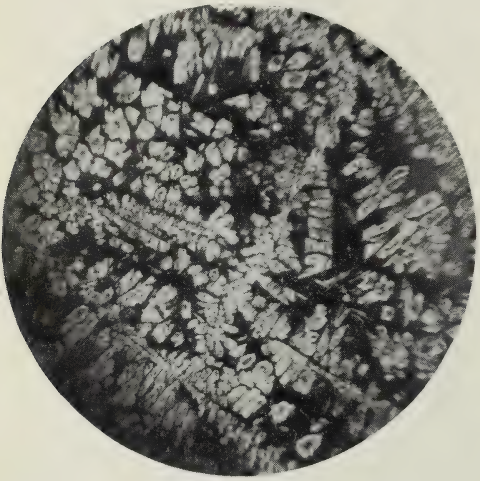
* Compare *Journ. Chem. Soc. of London*, 1911, vol. xcix, pp. 195–208.

* A more or less detailed exposition of some modern metallographic methods and results is contained in papers in the DENTAL COSMOS, 1908–10, by A. Fenchel. Unfortunately, in a few instances discrepancies have crept in; for example (see his paper, June 1908) it is stated that, in the case of an alloy of two metals, these metals can coexist with one or more chemical compounds. This is contrary to the "phase rule," which allows of only two coexistent species, *e.g.* one metal plus one compound, etc.

The relationships for alloys containing more than 75 atomic per cent. silver are fairly complicated, owing to the formation and subsequent partial decomposition of solid solutions rich in silver. Fortunately this scarcely affects the dental alloys, since at 75 atomic per cent. silver a compound Ag_3Sn is formed. The only point is that this compound takes time to be formed completely, for it is decomposed at any temperature above 480° C.

FIG. 1.



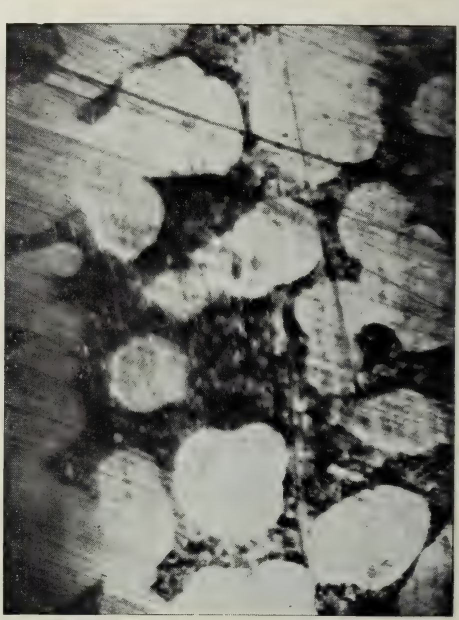
Alloy 50 per cent. silver, 50 per cent. tin, cooled in ten minutes. (Magn. 50 diam.; etched with HCl.) Two elements—dark granular eutectic and light crystalline Ag_3Sn.

Hence we may draw the conclusion that, other things being equal, it is better to use alloys containing less than 50 per cent. of silver, for these melt below 480° C., and therefore there is no fear of retaining an uncertain amount of these rather variable solid solutions in the solid castings of alloy.

Since Ag_3Sn was the only compound discovered by Petrenko, all alloys containing less than 75 atomic per cent. silver (73.1 per cent. by weight) consist of mechanical mixtures of Ag_3Sn with pure tin, the crystals of Ag_3Sn being embedded in an exceedingly fine granular eutectic mixture of Ag_3Sn and Sn. This we have confirmed, as will now be seen.

The compound Ag_3Sn exists at temperatures above 230° in a different form called β-Ag_3Sn, that existing at room temperatures being called α-Ag_3Sn. Now, as Petrenko himself emphasized, there is an important theoretical discrepancy in his results, in that the transition of β-Ag_3Sn, stable above 232°, into α-Ag_3Sn, stable below 232°, could not be detected when the alloy contained less than 50 per cent. of silver, although all the alloys lying between 35 and 75 per cent. of silver should consist, according to his results, of a mechanical mixture of

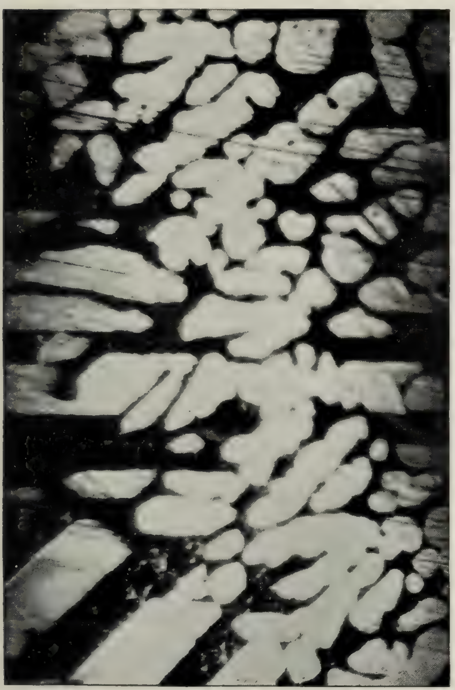
FIG. 2.



Alloy 50 per cent. silver, 50 per cent. tin, cooled gradually during forty hours. (Magn. 600 diam.; etched with KCN.) Two elements—dark granular eutectic and light crystalline Ag_3Sn.

pure tin with Ag_3Sn. In other words, the marked transition point of the Ag_3Sn at 232° had disappeared, while the alloy was still supposed to consist of Ag_3Sn to the extent of two-thirds of its weight. Thus it seemed altogether probable that Petrenko had overlooked some compound between silver and tin lying in the region of the dental alloys. A satisfactory hypothesis could be found to explain all the facts if it were assumed that a compound such as AgSn existed and was rather slowly formed. Fenchel's erroneous density determinations (COSMOS, January 1909), since retracted (January 1910), seemed to confirm the existence of further compounds.

FIG. 3.

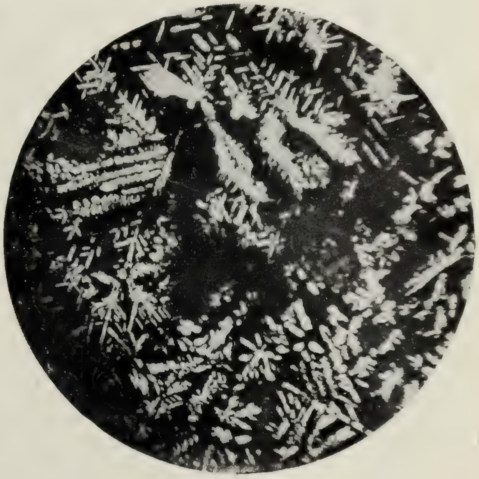


Alloy 40 per cent. silver, 60 per cent. tin, quenched from molten state. (Magn. 600 diam.; etched with KCN.) Two elements—dark granular eutectic and light crystalline Ag_3Sn.

In the first place, the attempt was made to discover whether any alloy mixed in the proportions corresponding with Ag_2Sn, AgSn, Ag_3Sn_2, or $AgSn_2$, would become homogeneous and solid when kept at constant temperatures lying between 220° and 300° for several days. In no case did the alloy completely solidify above the eutectic temperature, 220°.

These experiments alone cast much doubt on the possibility of the existence of any such new compound, for the latter must have existed above 232° in order to interfere with the transition of the Ag_3Sn at this temperature.

FIG. 4.



Alloy 25 per cent. silver, 75 per cent. tin, cooled in ten minutes. (Magn. 50 diam.; etched with HCl.) Two elements—dark granular eutectic and light crystalline Ag_3Sn.

All the alloys of tin and silver (less than 75 per cent. of silver) have been systematically investigated with regard to their microstructure. The alloys were submitted to various treatment (quenching in water from the molten condition; annealing for days in a molten lead bath; ordinary cooling in air, etc.), and then sections were etched by various reagents and examined in a Zeiss apparatus for metallography.

Four typical photomicrographs are illustrated. The result was decisive; all the alloys containing less silver than corresponds with Ag_3Sn are unmistakably heterogeneous, no matter how prepared or how annealed or given time to age.

Thus the results are conclusively in support of Petrenko's view, that all alloys, if well annealed, contain only the compound Ag_3Sn and free tin, no other compounds being formed under any circumstances.

AGING OF FILINGS OF ALLOYS OF SILVER AND TIN.

Dentists have long held that the alloys of silver with tin, which constitute the essential portion of dental amalgam alloys, undergo profound changes in their properties merely through lapse of time. This phenomenon is technically called "aging," and it is taken into account in dental practice, although not much is definitely known in regard to it.

In 1895–97, Dr. G. V. Black published a series of researches bearing on this subject (see Dental Cosmos, vols. xxxv–xxxix), and his results have since been given unquestioned authority. He found that fresh filings of these alloys required half as much mercury again for amalgamation as was required by similar filings which had been kept for some months, or which had been heated for half an hour to 100°. Exclusion of air did not affect these results. Again, the amalgams made from freshly prepared filings showed quite different volume changes from those exhibited by the amalgams made from "aged" filings.

In order to confirm the existence and to determine the extent of "aging," the following method was adopted: A weighed quantity of filings, about 4 gm., was shaken with excess of mercury for exactly two minutes, and thereupon the excess of mercury was squeezed out through a small bag of chamois leather by a 56 lb. weight applied through a piston in a cylinder 20 cm. in diameter. The weight was applied four times in succession, each time during thirty seconds, and it was gently rocked so that the loosely fitting piston just moved in the cylinder.

No amount of squeezing will remove all excess of mercury, but it was found that the amounts squeezed out in duplicate experiments were sufficiently constant.

If a certain amount of filings, taken immediately after filing, be treated with excess of mercury as above, a definite value is obtained for the ratio of the weight of mercury retained in the residue to the original weight of filings taken.* Thus, for example, the first two values in Table I were obtained from an alloy of 60 atomic per cent. of tin and 40 atomic per cent. of silver, the ratio of mercury to alloy found being 0.78 and 0.88. Such filings, freshly prepared by filing up a cast ingot of alloy, are termed "unaged" when the filings have not been subjected to further treatment before amalgamation.

Table I.

Composition of alloy.	Weight taken.	Mercury retained.		Ratio. Mercury : alloy.
		Unaged.	Aged.	
Silver, 40 per cent.	4.37	3.42	—	0.78
" " "	4.67	4.14	—	0.88
" " "	4.47	—	1.84	0.41
" " "	4.63	—	1.89	0.41

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* Owing to the very low solubility of tin and silver at room temperature, the mercury squeezed out removes only a negligible amount.

The last two results in Table I were obtained from the same filings, but these were heated for thirty minutes in an atmosphere of hydrogen at 100° before amalgamation. It is seen from the table that these "aged" filings retained only half the amount of mercury that the "unaged" filings did, namely 0.41 instead of 0.83 of their weight.

The existence of this unique phenomenon is thus confirmed, although no method of measurement or even of detection of this property is known other than that already described.

It will be noted that the terms apply directly only to filings, and not to the massive metal.

It will be readily understood that most of the filings examined were neither completely "aged" nor ideally "unaged." The unsatisfactory nature of the only method of examination available, also, prevented the result from possessing any high degree of accuracy. The accuracy attainable, under good conditions, hardly exceeded one unit of the first place of decimals in the ratio, Mercury retained: Weight of alloy.

In Table II are given the standard numbers representing the "aged" and "unaged" states respectively for the various alloys. The composition of the alloy is expressed in atomic percentages of silver and tin, and also in percentage by weight of the compound Ag_3Sn. The last two columns represent the ratio between the amounts of mercury retained by 1 gm. of "unaged" and "aged" filings.

A glance at the last column of Table II shows that aging depends upon the amount of the compound Ag_3Sn present, being greatest for pure Ag_3Sn and disappearing entirely for pure tin. This, indeed, is the conclusion come to after many further experiments, and we must therefore regard "aging" as being a property solely of the compound Ag_3Sn present in the alloy, possibly due to poly-

TABLE II.*

Mercury Retained by "Aged" and "Unaged" Filings.

Composition of alloy.		Unaged filings.	Aged filings.	Ratio of mercury.
Per cent. Ag.	Per cent. Ag_3Sn.	Mercury : alloy.	Mercury : alloy.	Unaged : aged.
75.0[a]	100.0	2.10	0.71	2.96
70.0	92.8	1.65	0.84	2.0
55.0	72.0	0.89	0.36	2.6
40.0	51.7	0.88	0.38	2.4
35.4	45.4	0.89	0.49	1.8
25.0	31.7	0.86	0.52	1.65
10.0	12.6	0.77	0.49	1.6
3.84	4.77	0.57	0.60	1.0
0.0	0.0	0.43	0.45	1.0

[a] Cooled from 430° to 200° in an electric furnace during a period of three days; the alloy was very slowly filed, and during the filing was cooled under a faucet every ten seconds. These values are relatively as well as absolutely the greatest which could be obtained. An alloy of this composition (Ag_3Sn), quickly cooled, gave a ratio of mercury to alloy of only 1.6.

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* Throughout the present paper all percentages are given in atomic percentages; for example, Ag_3Sn is represented as 75.0 per cent. silver—whereas by weight it would have been 72.5 per cent. silver.

merization of the Ag_3Sn. A number of alternative explanations have been definitely disproved; thus, "aging" is not connected with oxidation, nor with any transformation of α-Ag_3Sn into β-Ag_3Sn or *vice versa,* nor finally with the release, by annealing, of a state of mechanical strain. Pulverizing "aged" filings and thus exposing fresh surfaces does not render them "unaged." For details of the experiments the reader is referred to the *Journ. Chem. Soc. of London* (loc. cit.).

It was found that no more mercury is taken up either by "aged" or "unaged" filings after a few days, and the final proportion of mercury retained in the solid is the same in both cases; this, in confirmation of the results of the solubility measurements to be described, shows that the solid amalgams ultimately obtained from "aged" filings are identical with those made from "unaged" filings.

Thus the sole effect of "aging" is to retard the initial stages of amalgamation.

TIN AMALGAM.

Tin amalgam has been most thoroughly studied by W. T. van Heteren (*Zeitschr. anorg. Chem.,* 1904, vol. xlii, p. 129). He determined the melting-points of all amalgams from pure tin to 5 atomic per cent. of tin, which melted at 65°.

TABLE III.

Solubility of Tin in Mercury.

Temperature.	Tin in liquid phase.	
	Van Heteren.	Joyner.
-18.8° C.	0.36 atomic p. c.	—
0.0	0.59 " "	—
14.0	—	1.05 atomic p. c.
15.0	0.97 atomic p. c.	—
25.0	1.21 " "	—
25.4	—	1.24 atomic p. c.
63.2	—	4.04 " "
90.0	—	18.0 " "
163.0	—	66.7 " "

The foregoing table (Table III) contains all his analyses of mercury saturated with tin, together with some further determinations.

From electromotive force experiments, he concluded that no compound between tin and mercury exists, but solid tin amalgam is simply mixed crystals containing about 1 per cent. of mercury.

The results show decisively that tin forms no compounds with mercury, but that the tin takes up 1 per cent. or so of mercury to form soft hexagonal crystals (solid solutions). Any excess of mercury remains in the liquid condition, and this liquid contains only about ½ per cent. by weight of tin. We thus see that in accordance with experience tin amalgam cannot harden, no matter how long it is kept; and further, that the presence of excess of mercury would render free tin worse than useless as a constituent of dental amalgams.

It will be seen in the sequel that tin is always present in the free condition in dental amalgams, and hence that excess of mercury must be most definitely guarded against.

SILVER AMALGAM.

The constitution of the silver amalgams at the ordinary temperature has been finally established by the thorough investigation of Ogg (*Zeitschr. phys. Chem.,* 1898, vol. xxvii, p. 285) and Reinders (*ibid.,* 1904, vol. liv, p. 609). Only the compounds Ag_3Hg_4, Ag_3Hg_2, and Ag_3Hg can exist, and of these Ag_3Hg_4, commonly called "arbor Dianæ," is the only one readily formed.

The following determinations of the solubility of silver in mercury (*i.e.* of the composition of the liquid phase in equilibrium with the compound Ag_3Hg_4) have been made:

TABLE IV.

Temperature.	Atomic per cent. of silver in liquid phase.
14° C.	0.07
25	0.082
30	0.086
63	0.19
90	0.34
163	1.13

Reinders obtained 0.076 atomic per cent. at room temperature.

The Ternary System: Tin, Silver, Mercury.

Chemical literature contains no data at all in regard to the alloys of mercury with silver and tin. The solid amalgam used for dental fillings are usually made by filing up the silver-tin alloy, rubbing it with mercury in the hand or in a mortar, and squeezing out some of the excess of mercury. The pasty, semi-crystallized solid so obtained hardens within the course of a few hours or days, although very slight changes of form and possibly of volume continue to take place for many months or years. This hardening is obviously due to chemical change, although it has been hitherto unexplained. The experiments which follow demonstrate conclusively that the chemical reaction results in the breaking up of the compound between the tin and the silver (Ag_3Sn) in order to form the compound Ag_3Hg_4, leaving all the tin in the free state. As will be seen, other relationships hold at higher temperatures.

Comprehensive series of cooling curves of the various amalgams were taken, but the chemical changes involved are too slow for this method to be advantageous. It was found that all amalgams of tin and silver, even those that have long hardened, undergo partial fusion at 65° to 100°, and gradually become more completely fluid as the temperature is raised. No break in the cooling curves is met with at higher temperatures. This means that there are only two groups of equilibria, corresponding with higher and lower temperatures respectively.

The most suitable method of investigation for these amalgams was found to be the study of the effect upon the concentration of the liquid amalgam when excess of mercury is taken and the relative amounts of silver and tin in contact with it are varied. The simplest possible relationships were found to hold; the composition of the liquid amalgam was quite independent of the ratio between the amounts of silver and tin present. The liquid amalgam from any alloy had just the same tin content as was obtained from pure tin, and the amount of silver was also independent of the amount of tin. This shows that the tin and the silver are not combined with each other in any way in the presence of excess of mercury, and that therefore the products of amalgamation are the same as if each had been amalgamated separately. These are, as we saw above, solid solution of tin containing 1 or 2 per cent. of mercury, and arbor Dianæ, Ag_3Hg_4. This deduction may be shown to have a firm theoretical basis in the "phase rule."

The following experiments were carried out with "aged" filings at 25.40° ± 0.01°:

TABLE V.

Alloy—tin.	Per cent. of tin in liq. amalgam.	Per cent. of silver in liq. amalgam.
100 per cent.	0.743	—
90 "	0.751	—
80 "	0.750	—
70 "	0.760	0.045
60 "	0.746	0.046
50 "	0.748	0.048
40 "	0.762	0.050
30 "	0.751	0.040
20 "	0.743	—
10 "	0.752	—
0 "	—	0.043
Average	0.751	0.045

A repetition of the above experiments, using double the amount of "aged" filings for the same amount of mercury, gave the following results (there was not enough liquid phase for analysis in the experiments using 10 and 20 per cent. of tin):

TABLE VI.

Alloy.	Per cent. of tin in liq. amalgam.	Per cent. of silver in liq. amalgam.
50 per cent. of tin	0.751	0.043
40 " "	0.755	0.040
65 " "	0.748	0.046
70 " "	0.756	0.044
Average	0.753	0.043

Finally, the following experiments with "unaged" filings were carried out, but at 25.6° ± 0.01°:

Table VII.

Alloy.	Per cent. of tin in liq. amalgam.	Per cent. of silver in liq. amalgam.
20 per cent. of tin	0.750	0.033
60 " "	0.760	0.044
78 " "	0.764	—
Average	0.758	0.041

These striking tables demonstrate that the solid amalgams formed from the "aged" filings are identical with those obtained from "unaged" filings, since the analyses of the saturated liquid amalgams do not differ by more than 0.8 per cent. of the 0.75 per cent. of tin present.

Similar experiments were carried out at 63.05° ± 0.15°, with the following results:

Table VIII.

Alloy—silver.	Per cent. of tin in liq. amalgam.	Per cent. of silver in liq. amalgam.
0 per cent.	2.35	—
0 "	2.36	—
0 "	2.36	—
0 "	2.34	—
20 "	2.58	0.184
30 "	2.52	0.177
50 "	2.56	0.185
60 "	2.60	0.184
80 "	2.56	0.175
100 "	—	0.100
100 "	—	0.103

It is evident that at 63° the only two solid phases occurring are still the compound Ag_3Hg_4 and the solid solution of mercury in tin. The solubility of solutions saturated with respect to both mercury and tin forms a very flat curve through the three known points, and thus measurements at intermediate temperatures have been unnecessary.

Thus the general form of the ternary diagram is established for the temperatures from the melting-point of mercury up to 63°.

There is no eutectic mixture, since the solubility of tin and of silver both become immeasurably small well above the solidification point of mercury.

From all the above we may write the equation of amalgamation:

$$Ag_3Sn + 4Hg \longrightarrow Ag_3Hg_4 + Sn.$$

Thus the alloy, which is a mechanical mixture of tin and the compound Ag_3Sn, becomes a mechanical mixture of arbor Dianæ and pure tin.*

If we may refer again to Table II, we can see the danger of taking too much mercury, and thus of permanently softening the free tin in the amalgam. The data in the third column show that under the conditions of the experiments, where probably more mercury was squeezed out than is usual in dental practice, the amount retained by these carefully prepared "unaged" alloys was just about that corresponding to the formation of Ag_3Hg_4, while that taken by the "aged" filings was much less.

One might deduce from this that it is presumably better to "age" filings of dental amalgam alloy—in order to be sure of always having the same material, and secondly, in order more easily to regulate the amount of mercury. A further point is that since dental amalgams contain free tin simply in the form of a mechanical mixture, there is no decrease in chemical reactivity consequent upon increasing the proportion of silver. Thus amalgams made from alloys with under 50 per cent. of silver are chemically just as resistant as those containing more.

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* Fenchel (Cosmos, January 1910) postulates a similar result, but solely because it was then the simplest assumption to make in the absence of experimental evidence. It may be pointed out here that the calculations of the volume changes during amalgamation contained in his paper refer to the original mercury and alloy, taken before mixing and then after complete hardening. The volume changes which possess practical importance, however, are those which take place after the alloy is mixed with mercury and placed in the tooth until hardening is complete. It is possible that there may be an intermediate stage of amalgamation with the temporary formation of a ternary compound, so that the equation as given above would represent only the initial and final stages of amalgamation. We hope in a further communication to come back to this point, and to present experimental evidence with regard to the volume changes in question.

INFLUENCE OF HEAT.

At temperatures above 71.5° C. quite different relationships obtain. Probably a compound such as $(Ag_3Sn)_2Hg$ is formed, although this is not yet certain. In any case, series of solid solutions are formed and the dental amalgams expand very appreciably at 71.5° C.

Thus the expansion of an amalgam containing silver and tin in the proportions of Ag_3Sn at 71.5° C. is equivalent to that exhibited by an equal volume of paraffin oil when heated over a range of 5° to 10° C. The further investigation which we have undertaken as to the nature of the change should incidentally throw light upon the question as to whether or not, even at ordinary temperatures, arbor Dianæ, Ag_3Hg_4, is capable of taking up a small amount of tin in solid solution.

The sudden volume change at 71.5° C. takes place very slowly, and is even more slowly reversed. However, these relationships depend upon the temperature, as may be seen from the following table, which gives roughly the times required for the change to go one-fifth of the way in the direction specified. The behavior indicated is quite usual with chemical reactions of this type:

TABLE IX.

	Expansion ⅕ completed.	
Above 71.5° C.	At 11° above	In few min.
	At 0.5° "	In ¼ day.
	Contraction ⅕ completed.	
Below 71.5° C.	At 0.6° below	In 6 days.
	At 1.5° "	In ½ day.

It is surely evident from the above that it is most inadvisable to introduce these incalculable complications when dealing with practical dental amalgams.

Hence, contrary to a practice often advocated (*e.g.* Fenchel, COSMOS, June 1908), dental amalgams should not be heated, since this heating will be followed by a slow contraction at the temperature of the mouth.

EFFECT OF ADMIXTURES.

It is to be expected that the relationships which have been obtained for amalgams of tin and silver will hold in their main features when we extend investigation to the quaternary systems containing small additions of copper or gold or platinum.

Summary.

Recalling the facts that—

(1) Mercury forms no compound with tin, and the amalgam which is a solid solution remains permanently soft.

(2) Silver readily forms only one compound with mercury, namely Ag_3Hg_4, arbor Dianæ.

The present investigation has shown that—

(1) No compound of silver with tin exists other than Ag_3Sn.

(2) The "aging" of the silver-tin alloys has been experimentally verified and investigated. Aging is a property of the Ag_3Sn, alone, contained in the alloys; it retards the initial stages of amalgamation, but does not affect the final products.

(3) When mercury is added to a silver-tin alloy the compound Ag_3Sn between silver and tin is broken up, the silver combining with the mercury to form arbor Dianæ, Ag_3Hg_4, the excess of tin remaining in the free condition as such.

(4) At higher temperatures different relationships hold, and the amalgams pass through a temperature of transition (at 71.5° C.) and thereby undergo an appreciable but slow expansion, which is very slowly reversed after cooling.

From the above we deduce that—

(1) Dental amalgam alloys containing less than 50 per cent. of silver are chemically just as resistant in the mouth as those containing more silver, and the use of the former alloys excludes possible though as yet uninvestigated complications.

(2) The worst possible error in the mixing of a dental amalgam is to have

present mercury in excess of the proportion required to form Ag_3Hg_4 with the silver present (that is, a weight at most 2.4 times as great as the silver present), since this mercury will attack the free tin present, with the formation of permanently soft tin amalgam. It is obviously just as important that such excess should not occur locally—*e.g.* at the surface of a filling, due to the manipulation while inserting in the tooth. (See Dental Cosmos, vol. xlix, 1907, p. 1105.)

(3) Since the degree of "unagedness" of fresh filings of alloy is variable, it is presumably better always to age the alloy before use in order to obtain uniform results.

(4) Since aged alloy takes up less mercury, there is the additional advantage, in employing only aged filings, of a greater possibility of restricting the amount of mercury taken, in accordance with (2) above.

(5) Heating the pestle and mortar used for amalgamation, or heating a dental amalgam, should be avoided, as introducing slow after-changes of volume. These are at present incalculable, although they certainly exist.

ULCERATIVE GINGIVO-STOMATITIS DUE TO VINCENT'S BACTERIA.

By HAROLD S. VAUGHAN, D.D.S., M.D., New York, N. Y.

(Abstract of a lecture given before the Section on Oral Surgery of the First District Dental Society of New York.)

INFECTIONS of the fauces and tonsils, spoken of as Vincent's angina, ulcero-membranous angina, chancriform angina, and diphtheroid angina, have been reported by numerous writers during the past ten years. A few references have been made to the condition of the oral cavity alone, but on the whole, dental literature has little to say on the subject.

The writer considers this infection of considerable importance, as many cases of pyorrhea alveolaris owe their inception to the destruction of the interproximal gingival tissue produced by this ulceration.

During the past four years seventeen cases have been seen in private practice; some have been very mild, involving only the interproximal gingiva in two or three places, while other cases presented ulcerations of all the interproximal spaces and adjacent structures.

Vincent's angina is of great importance from its close resemblance to diphtheria, and also on account of the fact that certain of the mouth ulcerations may be mistaken for syphilis. According to H. C. Plaut(12) the bacillus and spirillum found in this disease were described by Miller about 1883, and were considered by him as saprophytes of the mouth. Babes(13) reported the organisms from the gums in scurvy. H. C. Plaut(12) in 1894 described cases of fetid membranous stomatitis and tonsillitis in which a spirillum and fusiform bacillus —called by him "Miller's bacillus"— were found in the exudate. These reports received little attention, but in 1896 H. Vincent(14) described similar organisms in cases of hospital gangrene seen in Africa. In 1898 Vincent(15) again reported the same germs in pure growth in tonsil ulcers. This latter report attracted general attention, and since that time considerable literature has appeared on the subject, Vincent's name being coupled with the germ combination of a fusiform bacillus and spirillum.

Regarding the work in this country, Sobel and Herman(²) in 1901 reported twelve cases of sore throat in children, in one of which the ulceration involved the tongue and cheeks more particularly; smears of the exudate showed Vincent's bacteria.

W. N. Berkeley(³) in 1905, in a paper before the Section on Medicine of the New York Academy of Medicine, called attention to the importance of this disease. He refers to the fact that instead of the tonsils, the lips, gums, cheeks, the tongue, or all combined, may show a pseudo-membrane or one or more ulcers in which bacteria are present in large numbers.

Colyer and others have referred to the presence of these organisms in gangrenous stomatitis.

W. J. Lederer(⁸) in 1909 reported four cases of buccal Vincent's angina seen at the German Hospital, New York city.

Although the majority of the cases reported have been infections of the tonsils and fauces, we note that the activity of these organisms has not been confined to this region. H. Arrowsmith(⁵) has reported a case involving the larynx only; Held(⁶) one of the middle ear and mastoid with fatal termination; Yates(¹¹) one of mastoid infection.

The writer, in looking over the reports on this subject, has been unable to find any literature fully descriptive of this infection as he has observed it in the oral cavity, although in some of the older cases the appearance is similar to the phagedenic pericementitis of Black.

PATHOLOGY.

The organisms grow in masses, producing a penetrating ulceration of variable size, located on inaccessible places between the teeth and producing destruction of the interproximal gum tissue, pericementum, and alveolus, forming deep pockets that are very difficult to cleanse. As the alveolus disappears, the tooth is left without support and becomes loose, thus favoring deeper infection. Another favorite location is at the gingival margin on the buccal side of the second and third molars, where the overlying cheek prevents proper cleansing.

The ulceration consists of a grayish, necrotic covering, which when rubbed off leaves a highly sensitive, bleeding surface beneath. The reproduction of this membrane is very rapid, the deposit accumulating again in an hour or two. Smears from these deep ulcerations in acute cases show pus cells, necrotic fragments, mucus, and nearly pure growth of the Vincent's bacteria. The surrounding gum is deeply congested; the submaxillary and cervical lymph nodes are enlarged, and extremely tender in some cases.

Another favorite location for the ulcers is at the gingivo-buccal angle, especially in the third molar region. Mild cases commence with a small ulceration of the interproximal gingiva. The surface of the ulceration is covered with a grayish deposit, which on removal leaves a bleeding surface; the margins are deep red. The patient may first notice this condition by the pain and tenderness on pressing the tongue against the involved interspace and also by the sensitiveness and free bleeding on brushing the teeth.

The age in the writer's cases varied between nineteen and fifty; as to sex, there were thirteen males and four females.

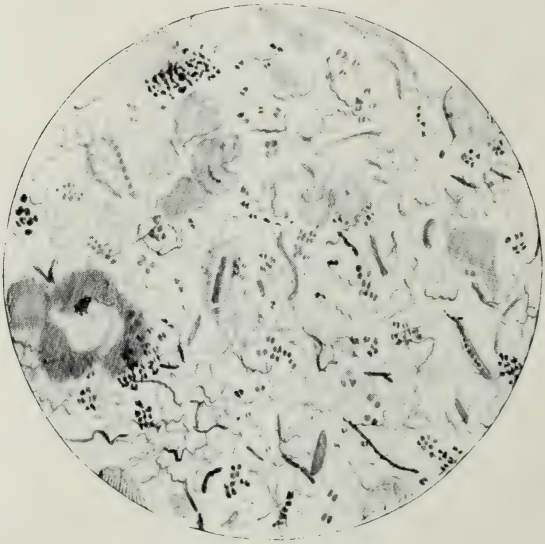
SYMPTOMS AND SIGNS.

The symptoms vary with the severity of the cases from slight ulcerations sensitive to the touch to extreme involvement with severe constitutional symptoms—temperature 102° F., dysphagia, headache, malaise, nausea, marked salivation, loss of appetite, and glandular enlargement. The ulcerated areas are extremely painful, especially when subjected to irritation by pressure from the tongue and by movements of the lips and cheeks and particles of food in eating. There is local heat and pain out of proportion to the size of the lesion and increased cardiac and respiratory action; the gums are tender and bleed easily. A characteristic feature in severe cases is salivation, especially at night, the pillow being stained with blood-streaked saliva. The odor of the breath is offensive and of distinct diagnostic importance to one who has noted it in other cases. The mucous membrane of the mouth is deeply congested.

Communicability. In the writer's cases, in one instance the husband and then later the wife became infected. Berkeley, Sobel, Lederer, as well as other writers, have reported two or more cases in one family.

Duration. Mild cases will recover in from one to three weeks, while those of long standing may take a much longer period, though the ulcerative process may be under control. Several of the writer's cases were seen early, before extreme ulceration, and these were easily controlled; therefore too great emphasis cannot be placed upon the importance of early recognition of the ulcerations, before the gingival septum has been destroyed, as they can then be quickly cleared up, before permanent damage to the supporting structures of the teeth has occurred, whereas deep inaccessible pockets may serve as centers for reinfection.

FIG. 1.



Showing Vincent's bacteria. (After W. G. Lederer.)

DIAGNOSIS.

The diagnosis is made by the appearance of the ulceration, the grayish necrotic deposit—with a bleeding surface beneath on removal of this deposit—the partial or complete loss of the gum festoon, and the odor of the breath, which is characteristic.

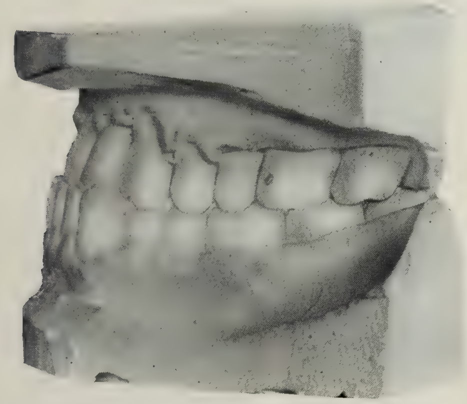
Microscopical examination. With a sterile instrument or platinum loop, some of the deposit or pseudo-membrane is taken from the ulcer and spread thinly over a glass slide. It is then fixed by passing through a flame, and stained with carbol-fuchsin; examination by a competent bacteriologist is necessary.

BACTERIOLOGY.

Reference is frequently made to bacteria of similar appearance occurring as saprophytes in old pyorrhea pockets without causal relation. In these cases the organisms may have become attenuated and lost their virulence, although following a severe Vincent's infection. A fertile soil remains for the development of pyorrhea alveolaris.

The organisms occurring clinically as Vincent's bacteria are two in number: (1) A spindle-shaped bacillus, which Vincent named *Bacillus fusiformis.* Its length is 7 to 14 microns and 1 to 2 in thickness. It stains best with Ziehl's carbol-fuchsin, often having a beaded appearance—unstained zones with stained areas between. (2) A spirillum about one-half as thick as the bacillus, staining much more lightly. Its axial length is 15 to 25 microns. As yet it has been found impossible to cultivate these organisms on artificial media.

FIG. 2.

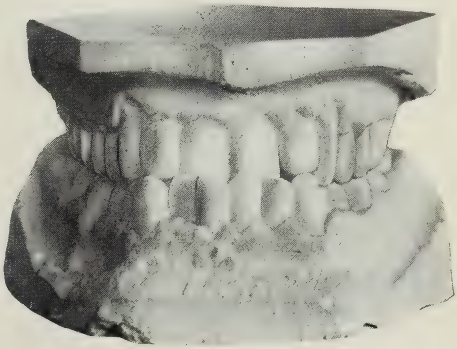


Lateral view of models from Case II, showing destruction of the gingival margin and interproximal septa.

TREATMENT.

The first essential is thorough cleansing of the teeth and mouth; a light diet should be given, and the bowels should be freely opened; cold compresses or an ice-bag should be used for the glandular enlargements. As a local application to the ulcers, every two or three days, the writer has found the following agents of value: Silver nitrate, 15 to 30 grs. to the ounce of water; Lugol's solution; chromic acid 10 per cent.; zinc chlorid 2 per cent.; argyrol, full strength. The teeth must be kept perfectly clean, using sprays, or the patient can use a bulb syringe to flush out each interproximal space. Mouth-washes should be used several times daily. Lederer advises 1:10,000 bichlorid of mercury in a 4 per cent. solution of boric acid. Berkeley suggests sodium bicarbonate and boric acid—equal parts in warm water. The writer has used liquor formaldehydi in the following prescription:

FIG. 3.



Anterior view of models from Case II.

℞—Menthol,	gr. ij
Thymol,	gr. ij
Liq. formaldehydi,	♏xxx
Spts. vini rect.,	℥iij
Aqua as advised,	℥viij.

Sig.—Teaspoonful in part of a glass of water as a mouth-wash.

SURGICAL TREATMENT.

The writer in severe cases has had good results from excising a V-shaped portion from the labial and lingual wall of an interproximal pocket, thus reducing its depth and favoring cleanliness. Dr. Clinton B. Parker of Brooklyn, N. Y., obtains good results by even more radical excision than that followed by the writer in these cases.

The following histories of several typical cases are given, showing the severe and mild grades:

Case I. J. T., age thirty-five; first seen in November 1908. Family history negative. For the past two months had complained of pain and soreness of the gums, which bled freely; increased salivation. In the morning his pillow would be stained with blood streaked saliva.

The submaxillary and cervical glands were enlarged and very painful, the tongue and buccal mucous membrane very red, the breath offensive, and there was ulceration of the gingival margin about all the teeth and which had extended, forming deep pockets in many places. In addition there was a large ulceration of the cheek adjoining the lower left third molar. Temperature 102° F., dysphagia, general malaise and loss of appetite; smears from the gum examined by Dr. W. M. Higgins showed pure growth of Vincent's bacteria.

Owing to the deep ulcerations this case was extremely stubborn, and although the active ulceration was checked in a few days, it took three months to effect a cure. Eighteen months later a recurrence took place, though milder than the first.

Case II. Mr. L., age thirty-six; always enjoyed good health; history negative. For four months previous to consulting the writer he had been under treatment for inflamed gums, which were very sensitive and bled easily. There was bleeding and salivation at night, so that the pillow would be stained; some glandular enlargement; temperature normal, breath offensive, active ulceration of the gingiva with destruction of the interproximal gum tissue and bony septa in many places. Smears showed Vincent's bacteria.

Case III. Mr. McC., history negative; for past two weeks complained of bleeding and sore gums. Examination showed small ulcers in the spaces of the lower teeth from the second bicuspid on the right side to the left canine, the interproximal spaces being filled with a grayish deposit, which on removal left a bleeding surface; smears showed Vincent's bacteria. The teeth and mouth were thoroughly cleansed and applications of argyrol made to the ulcerated areas. Improvement was immediate, although it required several weeks to entirely clear up the condition.

Case IV. Mrs. C., age twenty-seven; always most careful about care of mouth; for past three days complained of several sore places between the teeth. Examination showed small ulcerations of the interproximal gingiva in several places; smears showed Vincent's bacteria. The ulcers were cleaned and painted with Lugol's solution, repeated twice; condition cleared up within a week.

In conclusion, the writer would emphasize the importance of early diagnosis and active treatment in these cases to prevent permanent damage to the supporting structure of the teeth.

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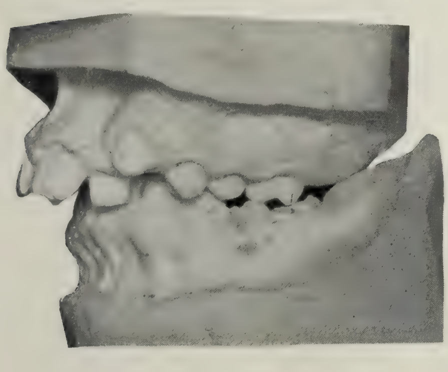
DEVELOPMENT OF THE BONES OF THE FACE AND JAWS BY ORTHODONTIC TREATMENT.

By ALLEN H. SUGGETT, B.S., D.D.S., San Francisco, Cal.

(Read before the California State Dental Association, June 15, 1911.)

ORTHODONTISTS are strongly emphasizing the importance of the exercise of function of the teeth and jaws, but the dental profession as a whole does not as yet grasp the full significance thereof.

FIG. 1.



IMPORTANCE OF EXERCISE FOR DEVELOPMENT.

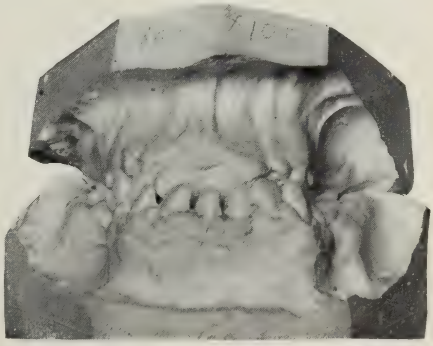
We all accept the broad proposition that exercise is essential to development, but many of our best dentists have for years had under their care patients whose teeth are in such a position that it is impossible for them to exercise their function properly. In some cases where all the teeth are in place, not one-half and sometimes not one-third come in contact with their antagonists, much less in occlusion. And how is it possible for such a patient to acquire the proper development of the jaws and face?

What kind of development could be expected in a hand if only one or two fingers were allowed any exercise? Furthermore, when we take into consideration that a large proportion of cases of malocclusion are accompanied with nasal obstruction, preventing proper breathing, and causing mouth-breathing, with its train of evils, we begin to realize that the effect of irregular teeth may be far-reaching.

EFFECTS OF MALOCCLUSION ON MASTICATION.

We know that when teeth are in malocclusion, the grinding surface that is effective is decreased in proportion to the extent of the malocclusion; we admit that food improperly masticated further handicaps the stomach. How, then, can we expect a child to have good health with half of his teeth lost, or, what amounts to the same thing, half of the teeth ineffective.

FIG. 2.



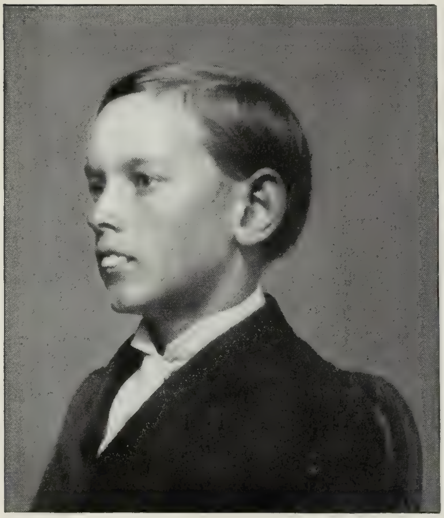
PRACTICAL CASES SHOWING NEGLECT.

A mother who was about to take a trip put her ten-year-old daughter under the care of a well-known dentist. When the mother returned two years later, the teeth had been carefully filled, but had been left in the position illustrated in Fig. 1. The well-known dentist did not grasp the full significance of occlusion.

Mr. I—, a young man, twenty-five years of age, has been under the care of another well-known dentist for years. He was told that nothing could be done for him. (See Fig. 2.)

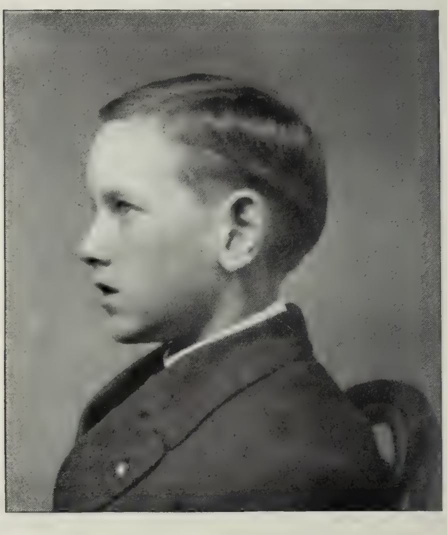
Was all that dentistry could do, done for these cases?

Fig. 3.



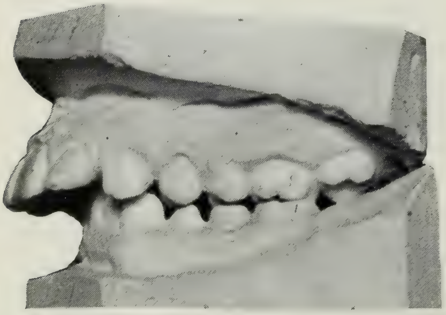
Before treating. (See casts Fig. 5.)

Fig. 4.



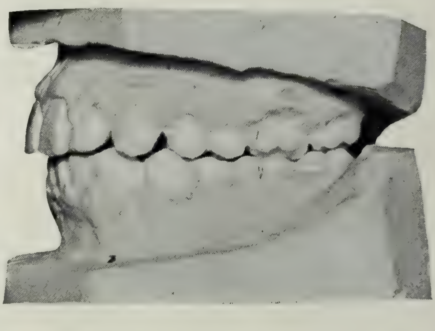
After treating. (See casts Fig. 6.)

Fig. 5.



Before treating.

Fig. 6.



After treating.

CASES OF CLASS II, DIVISION I.

In class II, division 1, of Angle's classification, there are cases that produce marked facial distortion. These cases exhibit the receding chin, the narrow, undeveloped mandible, the elongated front teeth, sometimes coming in contact with the mucous membrane on the roof of the mouth, the narrow upper arch, the front teeth protruding often over the lower lip. The teeth not being in occlusion and many of them not even in contact, there is loss of function. It is not possible for the muscles to get proper exercise, and their origin and insertion will be affected; the mandible, the maxilla, the zygomatic process, in brief, all the bones of the face and some of the thorax will fail to develop.

FIG. 7.

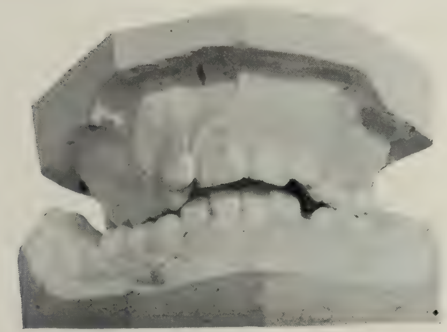
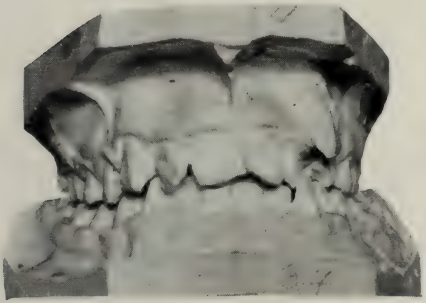
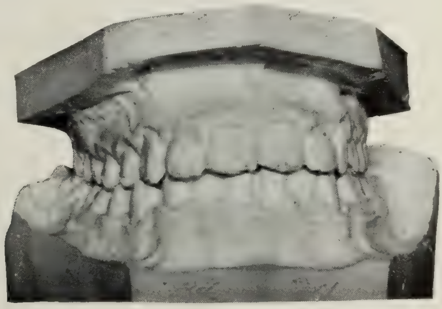


FIG. 8.



Before.

FIG. 9.



After.

EXPERIMENTS ON RABBITS.

Dr. Lawrence Baker of Boston demonstrated this by some experiments which he carried on with young rabbits. He selected a part of a litter and removed the teeth from one side of the jaws, thus destroying the function on that side. These rabbits were subjected to the same conditions as the control specimens, and at the age of seven months one was killed, and the skeleton prepared for examination. The edentulous side of the head showed marked lack of development, as did the mandible and the maxilla; the articular process of the condyle was distorted. In fact, all the bones that the muscles of mastication were attached to were undeveloped, and there was a deviation of the nasal bones. The muscles that controlled the movements of the lower jaw were noticeably atrophied and pale, as compared to the normal muscles. Dr. Baker's article, describing these experiments, was published in the February 1911 issue of *Items of Interest,* and is well worth a careful reading.*

A TYPICAL CASE.

The condition illustrated in Fig. 3 is a very common one, and one which may be seen almost any day on the street. It is distinguished by the narrow arch, the lack of development under the wing of the nose, and the upper lip. The nose itself is undeveloped, because the breathing is done through the mouth. The lack of development of the mandible is marked; it does not perform its functions properly, and therefore does not develop. It is not possible for every tooth to do its work, since only the molars

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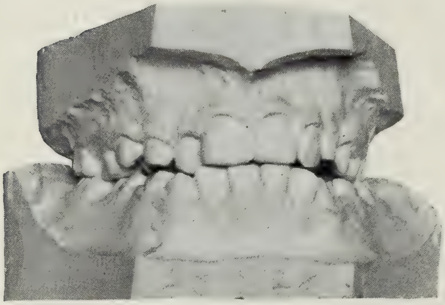
* [See also article by Dr. Baker in the present issue of the COSMOS, at page 663.—ED.]

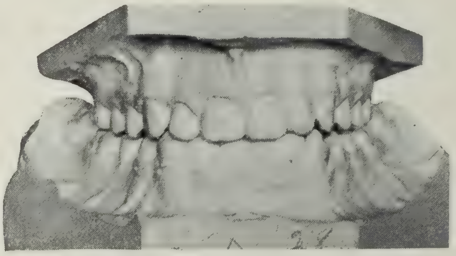
and bicuspids of the mandible occlude perfectly. (See Fig. 5.) The upper right second bicuspid is in torsal occlusion, turned nearly half around, thus impairing its own function and that of its antagonist. All the six upper and lower anterior teeth have nothing to occlude with. The narrow arch does not afford sufficient room for the tongue and it is crowded back against the palate and tonsils, interfering with nasal breathing. It would have caused mouth-breathing even if there had been no nasal obstructions in the form of lymphoid tissue. In treating this case, the teeth were moved into proper occlusion; each tooth has its work to do and does it. The arches have been expanded, improving the shape of the face and allowing more room for the tongue. (See Fig. 6.) The breathing is now normal, causing the nasal bones to develop. As air is taken in and expelled, it causes the muscles of the nose to expand and contract, driving the blood in and out, carrying food for development. (See Fig. 4.)

Fig. 10.



Before treating.

Fig. 11.

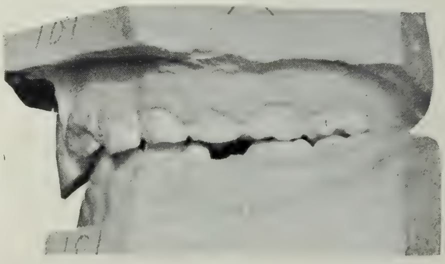


After treating.

EFFECTS OF NASAL OBSTRUCTION.

Quoting Mr. Wright of Denver: "This change of air-pressure must affect the air within the accessory sinuses, and in them as well as in the nose a change of pressure is obtained during expiration. During inspiration the air is drawn out of the sinuses and a negative pressure—less the atmosphere—is produced, therefore emptying the ethmoidal and other emissary veins at every inspiration, through this pump action of the pressure and release on these veins, and through them the longitudinal sinus and cavernous plexus. When the nose becomes so obstructed by malformation that air does not pass through it, this mechanism is interfered with and venous hyperemia of the meninges is produced, forming an important factor in the aprosexia of these cases."

Fig. 12.



There can be no doubt that this is true, since it is a well-known fact that habitual mouth-breathers soon fall behind in their school work. Their hearing becomes defective, and as a consequence they are inattentive. Their apparent dulness is no doubt due to a lack of blood circulation to the brain. At any rate, we acknowledge that when these cases of malocclusion are corrected and normal breathing is established, a marked improvement follows almost immediately. The illustrations Figs. 3 to 6 show that this very result occurred in the case described. It is gratifying to know that the rhinologists are taking keen interest in orthodontia, and are rendering and receiving valuable assistance. In many cases with narrow arches the rhinologist is unable to establish normal breathing even after he has removed the enlarged tonsils and all nasal obstructions.

There is literally no room for the passage of air, and normal breathing cannot be established until more room is provided. After the arches have been broadened, relief is brought about—first from the fact that there is additional room for the tongue, relieving the pressure on the palate and tonsils; later, from the effect of the broadening of the floor of the nose; later still, from the general development of the whole face. All these changes can be brought about by putting the teeth into proper occlusion. It has been assumed that the improvement in breathing was produced solely because there was an increased width of the floor of the nose. Dr. Cryer called attention to the fact that the widening of the floor of the nose did not afford the immediate relief that it was credited with, because in breathing the air did not pass along the floor of the nose, but through the middle meatus.

Some illustrations of cases that are not so extreme are shown, but they are nevertheless important, as they illustrate the symmetrical development and balance brought about by treatment. Cases like that shown in Fig. 10 are often allowed to take care of themselves. The effect of expanding the arches is marked. The case illustrated in Fig. 8 was much worse; Fig. 9 shows the model after treatment.

This case illustrated in Fig. 7 was allowed to run on, and resulted in a bad case of malocclusion.

The case illustrated in Fig. 12 was started off badly. The lower incisors were already striking the gums of the upper jaw. The patient is now seven years old. The case illustrated in Fig. 7 would progress in the wrong way very rapidly, and grow to look like that in Fig. 5; *now* is the time to treat it.

A CONTRIBUTION TO THE STUDY OF IMMUNITY TO DENTAL CARIES.

By **THEO. VON BEUST, D.D.S., M.D., Dresden, Germany.**

IN conducting a series of experiments for the purpose of determining the presence and nature of agents seemingly contributing to the state of immunity that apparently exists in some teeth, it occurred to me to attempt to disclose the character of the well-known figures, supposedly containing organic tissue, seen in sections of the enamel, and especially to ascertain if these had any connection with a possibly existing metabolism in that tissue. As these lines and figures have so frequently been described by various observers—for instance, by Bödecker, Williams, Morgenstern, and Caush—we can here dispense with a detailed description. (See Caush, DENTAL COSMOS, vol. xlvii; also Bödecker, DENTAL COSMOS September 1911.)

For the attainment of our purpose, freshly extracted teeth were cemented in the corks of bottles containing a strong alcoholic solution of fuchsin* in such a manner that only the tip of the root reached the fluid. After periods of time varying, according to the character of the specimen under treatment, from a few hours to two weeks, it was observed that the crowns had taken on a reddish hue. Slides ground from teeth treated in this manner showed that a direct communication by way of the above mentioned canals was existing between the pulp and the very periphery of the crown, *i.e.* the surface of the enamel, including in many cases the dental cuticle.

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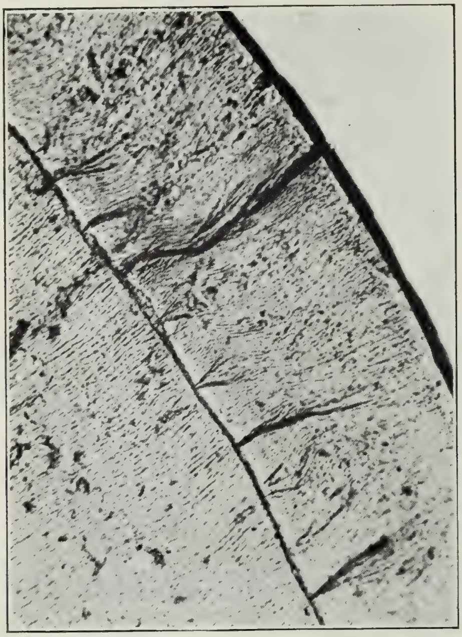
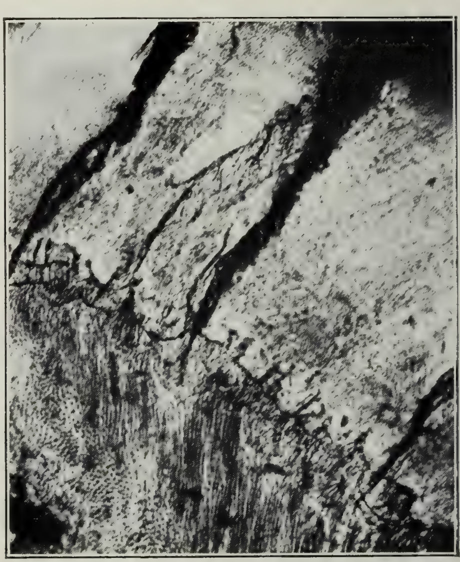
* To activate the capillary flow, common salt may be added to the solution.

Fig. 1.



Cross section of a central incisor. Subjected to the process of staining first described, for a number of days. The stain has penetrated the tuft-like processes originating in the layer between dentin and enamel.

Fig. 2.



Cross section of lower third molar, buccal wall. Stained like the foregoing. The dentinal fibers of this specimen pass directly into the canals of the enamel.

It is not the purpose of this paper to contribute to the histology of the enamel. The illustrations shown* (Figs. 1 to 7), being exact reproductions of the photomicrographs taken of the ground sections, are intended solely to illustrate the purport of the following statements:

(1) The lines, or canals, seen by former observers are channels through which plasma can reach all parts, generally speaking, of the enamel.

(2) The enamel is vascular to a varying, sometimes an extreme degree.

(3) This vascularity of the enamel renders it possible, even probable, that the immunity to caries observed in some teeth lies in the tooth itself, and is the result of the formation of anti-bodies. This does not signify that the saliva is to be excluded as a factor influencing immunity.

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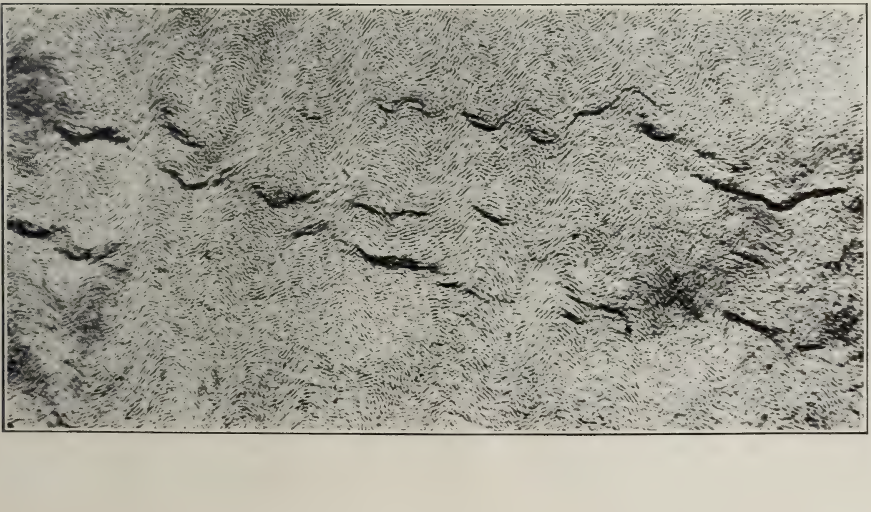
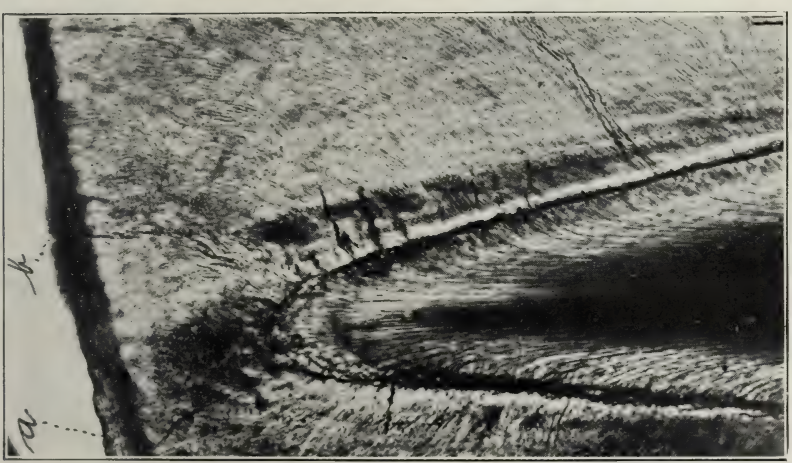
* These photographs were made from hard sections and have not been retouched. During the grinding, paraffin oil was used as a lubricant. Balsam mounts.

FIG. 3.



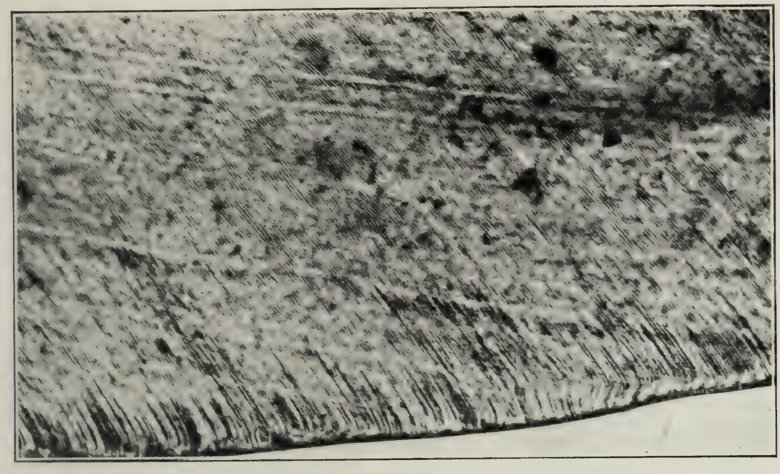
Cross section of enamel. The canals transmitting the bulk of the stain are seen to consist of peculiarly shaped fissures lying between the prisms. The finest canals present themselves as halfmoon-shaped lines partially enveloping the enamel rods.

FIG. 4.



Tip of a central incisor. Injected two hours. The tooth had been kept in 60 per cent. alcohol for a number of days previous to staining. In this as well as in the foregoing specimens the stain is detectable between the enamel fibers. The canals terminating at *a* and *b*, containing the red stain, can be clearly traced from the dentin boundary to the extreme tip of the tooth.

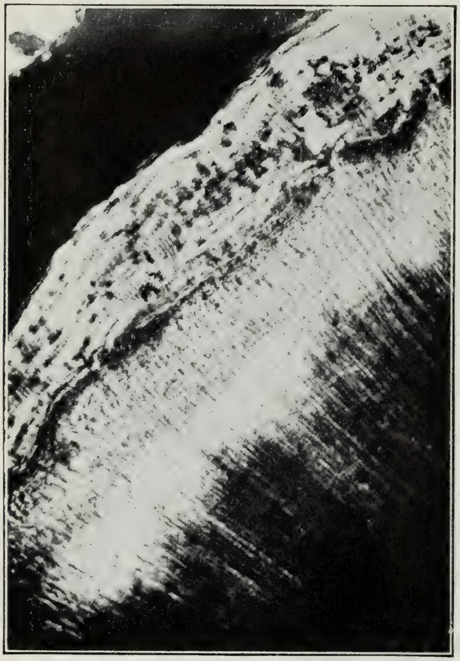
FIG. 5.



Bicuspid. Injected twenty-four hours. The stain has passed through this dense section of enamel and can be detected between the prisms everywhere. Close to the surface, where the tissue is not so compact, the coloring can be easily seen with low powers.

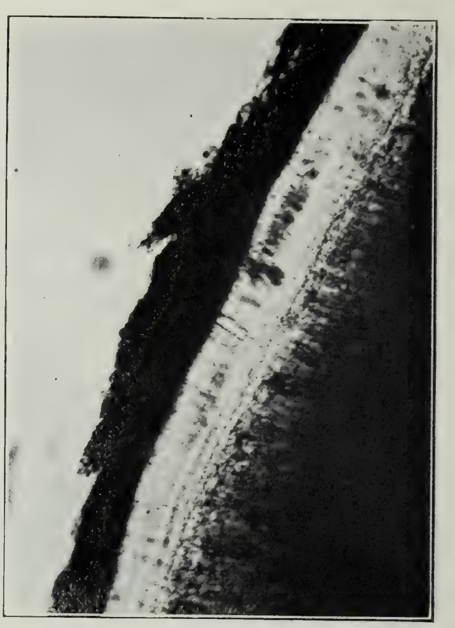
If the nozzle of a syringe is securely cemented into the enlarged apical opening of a root with a very large pulp cavity, from which the pulp has been removed (see Fig. 8), an interesting experiment can be made. The nozzle is filled with staining solution, a wire is repeatedly inserted and withdrawn in order to expel all air, the plunger of the syringe, which must fit tightly, is drawn out, and the parts of the syringe are assembled. With the fingers, or with rubber bands, pressure is exerted upon the piston. In a short time, varying from a few minutes to a few days according to the pressure and the density of the tooth, the staining solution will be perceptible in all parts of the external tissue. A section made from such a tooth shows the enamel canals stained, and in addition discloses the interesting fact that canals communicate through the dentin and cementum between the pulp and the peridental membrane, as shown in the photomicrographs. The intimate relationship existing between the pulp and the cementum are thus clearly demon-

Fig. 6.



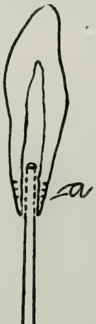
Cross section of root of central incisor. Injected thirty minutes. Alcohol material. The canals and the lacunæ of cementum have been reached by the staining fluid.

Fig. 7.



Another section of the same root. The stain has passed in this, as also in the foregoing specimen, through the canals of the cement into the pericementum; the coloring is not demonstrable in a photograph, however.

Fig. 8.



Syringe cemented to tooth. The cement is allowed to overlap the root, which has been grooved with a stone at *a*.

strated. These communicating channels explain, in my opinion, the sensation sometimes experienced by the patient while a drill is being used in dead roots, also the relative immunity of "dead" roots to the agents producing caries.

It appears to me that these experiments and observations are destined to dispel all doubts concerning the interprismatic substance as well as the metabolism present in the enamel, and cannot fail to modify our views concerning the factors influencing caries and immunity to caries.

A REPLY TO DR. WILLIAM BEBB.*

By LAWRENCE W. BAKER, D.M.D., Boston, Mass.

IN the February 1912 issue of this journal, Dr. William Bebb of Los Angeles, Cal., criticized my article, "A Preliminary Study of the Influence of the Forces of Occlusion on the Development of the Bones of the Skull," which had been published in the February 1911 issue of the *Items of Interest*. Probably few readers of the COSMOS saw the original article, as compared with the many who have undoubtedly read Dr. Bebb's criticism, but I hope that before forming a definite opinion the original report will be thoughtfully read, and the accompanying illustrations carefully studied with reference to the text. In no other way can justice be done either to my critic or myself, and we are both, I believe, seeking in all sincerity to get at the real facts of an interesting problem. This being the case, there can be nothing personal either in the examination to which my preliminary report had been subjected or in my own re-statement of certain points which the criticism has unfortunately misinterpreted.

On page 173 (first paragraph of the first column) Dr. Bebb says:

> Again, in Fig. 4 [Fig. "13," original article, and Fig. 6, this article], it will be observed that a line (A) has been drawn presumably across the cutting edges of the first premolars, to demonstrate the point under consideration. If my eyes do not deceive me, this line has been made to run from the cutting edge of the first premolar on one side to the point where the opposite one, ground down, emerges from the process. Examination of a specimen of this order will show that the first premolars deflect backward from the point where they emerge from the process to their cutting edges, to the extent of one millimeter or more. This alone would account for the deflection of the line which the essayist has drawn.

Dr. Bebb could hardly have made this statement had he read my article understandingly and grasped the basic fact underlying the experiment. The molars and premolars in the upper arch have not been interfered with, as will be seen both by a careful examination of the illustrations and by the following paragraph from my report: "Two of the remaining animals were operated on by grinding down the teeth on the right side of the lower jaw and the upper right central incisor. As the teeth elongated, repeated grinding rendered them useless, so that all the mastication was performed on the left side." Dr. Bebb's eyes certainly deceived him when they led him to believe that the experiment had in any way touched the molars and premolars of the upper arches. In both animals, moreover, I

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* See "A Criticism of a Paper by Dr. Lawrence W. Baker entitled 'A Preliminary Study of the Influence of the Forces of Occlusion on the Development of the Bones of the Skull.'" By Wm. Bebb, D.D.S. (DENTAL COSMOS, February 1912.)

Fig. 1.

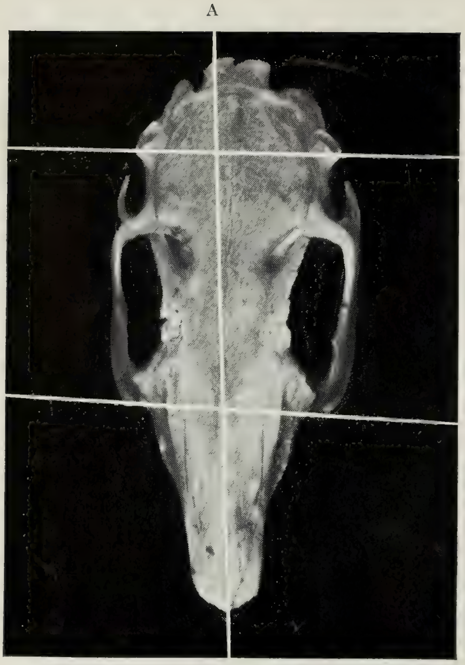


Fig. 2.

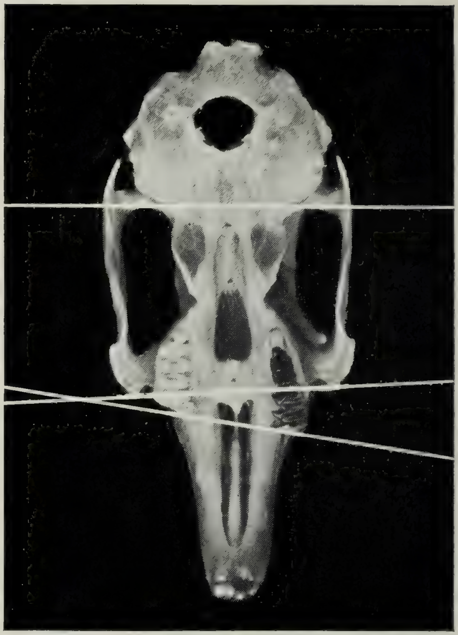
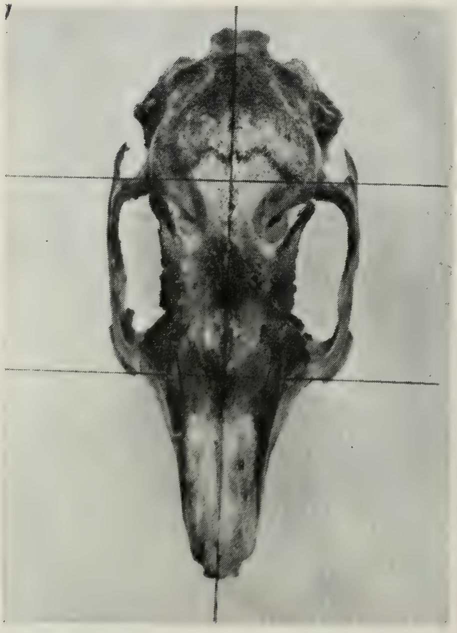
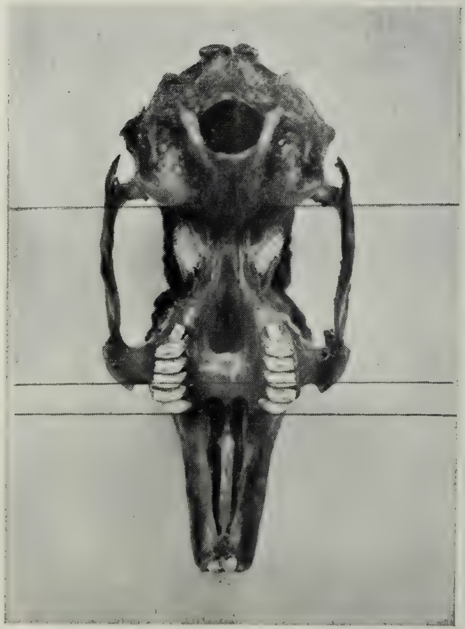


Fig. 3.



Normal.

Fig. 4.



Normal.

wished to emphasize the fact that the occlusal forces were interfered with in identically the same manner, and that in both cases the right premolars and molars have advanced with striking similarity. Students of the forces of occlusion and particularly orthodontists will, I think, unhesitatingly say that this dragging forward of the same region in both skulls was due to my interference with the equilibrium of the occlusal forces.

Evidently, too, I did not make the drawing of the longitudinal axillary line [Fig. "12," original article] clear to Dr. Bebb. This line [see Fig. 5, this article, line A] passes along the suture between the parietal bones. It will be noted that at the anterior aspect of the skull it falls some distance, in fact nearly half the width of one of the nasal bones, to one side. This indicates that the entire skull has been deflected to that extent, and the reader may himself test the accuracy with which I have here drawn this line, which quite disagrees with that drawn by my critic in Fig. 3 of his criticism.

Single sutures, however, are not always the most dependable points for measurement. To show more conclusively that this distortion exists, I have drawn another longitudinal axillary line (Fig. 5, line B) which begins at the other end of the skull at the suture between the nasal bones. It will be found that at the posterior aspect of the skull this line falls to one side of the median line, and shows quite as strikingly as line A that the skull has been deflected. The line B, moreover, corresponds with the longitudinal line [Fig. "5," original article] Fig. 1, line A [this article] which passes along the suture between the nasal bones of the other animal operated upon.

FIG. 5.

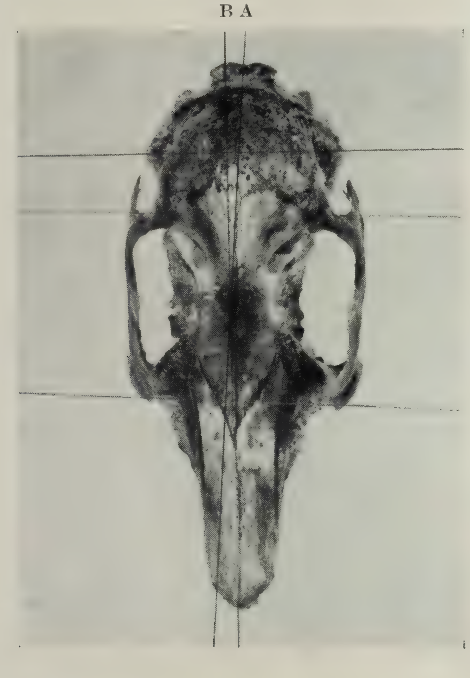
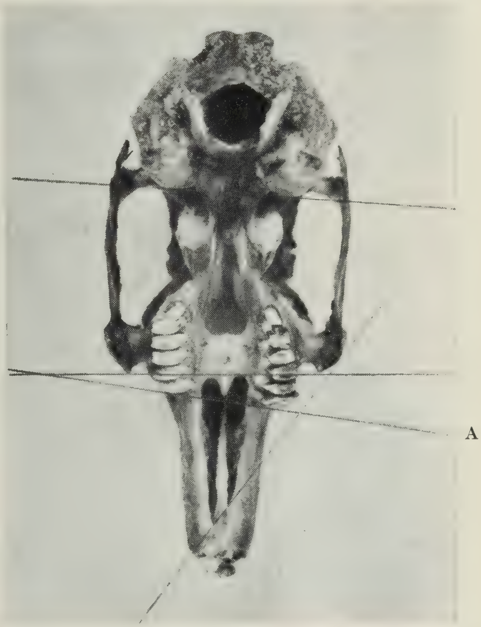
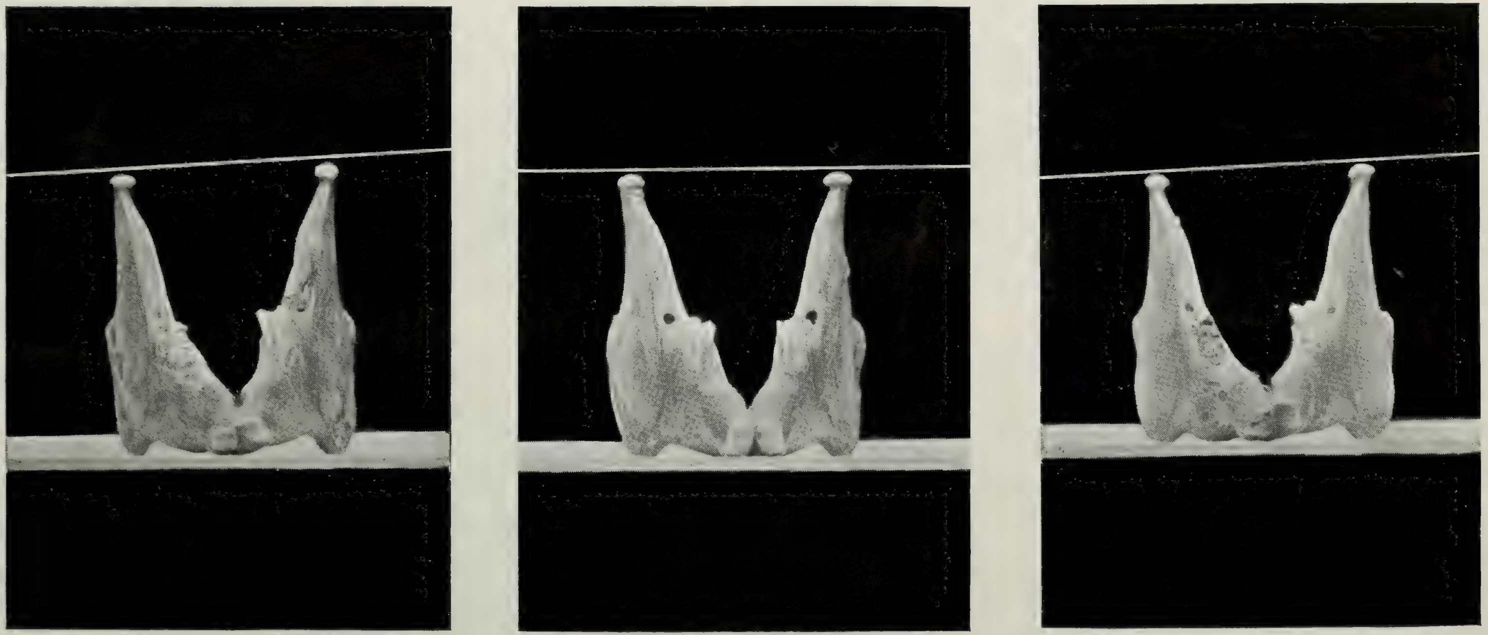


FIG. 6.



What I wish the reader to note particularly is (1) the striking similarity of the distortion in the views of both animals operated upon; (2) the striking similarity in the entire correlation of growth throughout both skulls; (3) the striking similarity of the dental deformity in the occlusal aspect of both skulls; (4) the striking similarity of the divergence of

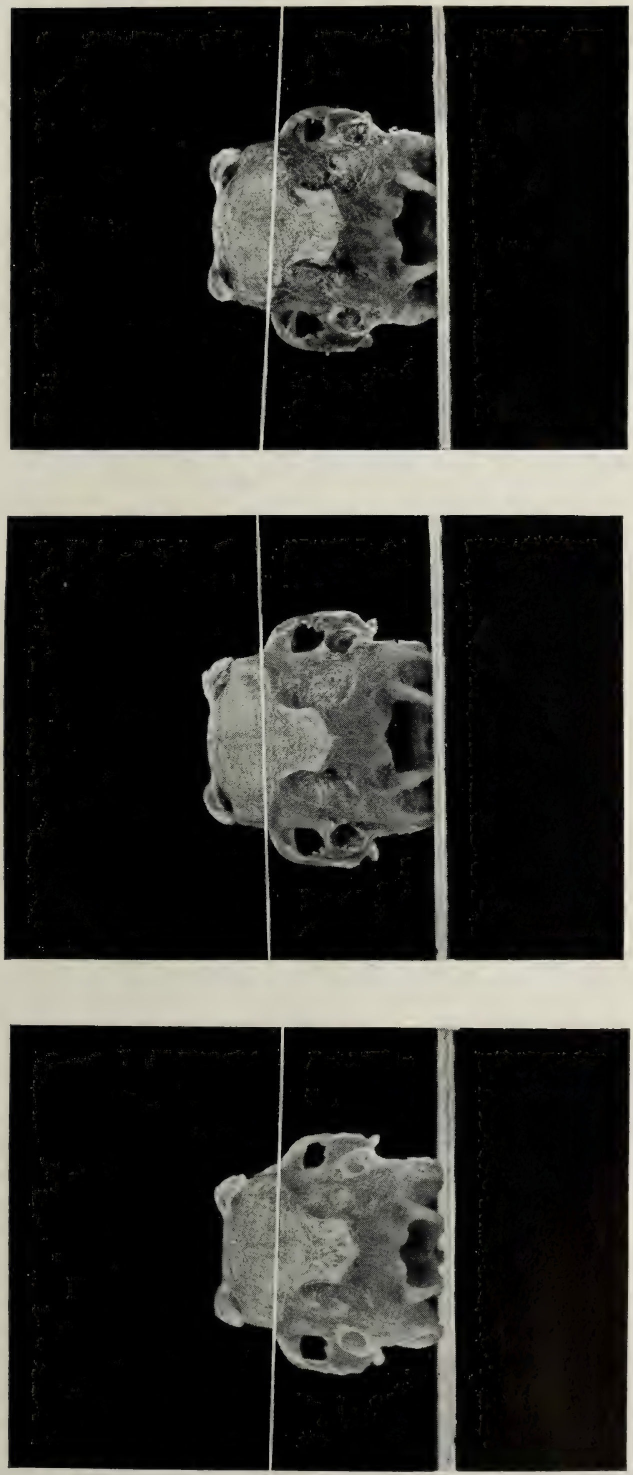
Fig. 7.



(*b*) (*a*) (*c*)

Normal.

Fig. 8.



(*b*) (*a*) (*c*)

Normal.

the transverse lines connecting corresponding points; and (5) the passing of this distortion up through the skulls as shown by the upper views (Figs. 1 and 5). Figs. 3 and 4 show the same views of the normal animal. Such variation, I believe, is greater than Dr. Bebb would find in a "normal specimen collected in its native habitat," and to find at random two normal specimens varying in such an identical manner would at least seem to demand the "long arm of coincidence."

To those who read my original paper in the *Items of Interest* I need say nothing further regarding the tremendous power of the occlusal forces and the way in which those forces are distributed to the bones of the skull through the medium of the muscles of mastication. I believe I have made it evident there that in overthrowing the balance of these forces, by interfering with the laws of occlusion, I at the same time interfered with their reaction on the skull. This interference, modifying as it did the muscular activity, brought about a change in the blood supply to these bones as well as a change in the mechanical forces acting on them, which in turn has had a direct influence on the cellular activity, and has brought about this extremely interesting asymmetrical development of the two skulls.

There remains one other link in the chain of evidence in this experiment that I have not as yet presented. If these skulls and their mandibles are viewed from still another aspect, it seems to me that we shall then have observed them from all practical viewpoints; and if we again find a striking deviation, and this deviation coincides with those that we have observed already, it would appear within reason to conclude that this modification of the skull is due also to my interference with the function of the dental apparatus. Fig. 7 shows the anterior aspect of the mandibles of the animals operated upon and the same view of the control animal. The method of interference with the occlusal equilibrium is plainly visible, and it is also evident that this interference with the equilibrium of occlusion has had its tangible influence on the equilibrium of growth of the bones. In both mandibles of the operated-on animals there is a striking similarity of deformity. In both cases the rami of the non-functioning side are shortened, and there is even a modification in the development of the temporo-maxillary articulation on this side, as indicated by the shape and size of the condyle.* In the normal case it will be noted that there was an equilibrium of growth throughout, including both rami and both condyles.

Fig. 8, again, shows the posterior aspect of both skulls, and reveals that the growth of those bones, far remote from the teeth, has been interfered with, as indicated by the lines passing through the junction of the superior aspect of the zygomatic processes and the sides of the brain-case, as well as by a noticeable variation in the zygomatic spaces themselves. These spaces on the side operated upon are visibly much smaller than on the functioning side, whereas in the normal rabbit there is little or no difference between them. From all points of view, the overthrow of the balance of growth here indicated accords with that found in the other views of the skulls, as well as in the mandibles. The development of both skulls, in fact, is in accordance with the basic evolutionary principle that the shape of a given bone is determined by the forces acting upon that bone. Realizing the full significance of this biological law, it is evident that I must also have been aware that there are many possible causes for bony variation. It was knowledge gained by studying this principle that led me to interfere experimentally with these powerful and constant occlusal forces.

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* The fact that the condyles were varied by the interference with the functions of the teeth coincides with a theory advanced by Dr. M. H. Cryer, in his work on the "Internal Anatomy of the Face" (see pages 157–59), regarding the skull of a human being in which the individual was forced to put the mandible in an abnormal position in order to masticate. The change in the occlusal forces caused a difference in the shape and size of the condyles. Owing to the lack of occlusion on one side, the markings of the origins and insertions of the muscles on that side were much less well defined than on the working side. This same condition was evident in my experiment; in fact, the condition went so far that the zygomatic processes on the non-functioning sides were perceptibly atrophied.

What I claim from the results observed is that the asymmetrical development of the two skulls and their mandibles was due directly to my interference with the occlusal forces, and was not a chance variation. I do not claim, however, that this preliminary study proves the theory; but it does indicate, I believe, the importance of the dental apparatus from a new viewpoint and as a very important factor in the development of the skull as a whole. In order to make this work of conclusive scientific value, I quite agree with Dr. Bebb that similar experiments must be applied to a larger number of subjects, and to the other members of the three great classes of mammals. But I believe the work is significant and important, and I am endeavoring slowly and patiently to make the theory a scientific fact.

TREATMENT OF CHRONIC ALVEOLAR ABSCESS WITH FISTULA DISCHARGING ON THE FACE.

By L. W. DOXTATER, D.D.S., New York, N. Y.

HISTORY.

THE patient, a married woman, had been suffering from severe pain in both upper and lower jaws. The family physician had diagnosed her condition as neuralgia, and had treated it as such for several weeks. The treatment was unavailing, however, the patient's condition steadily growing worse, and her general health beginning to show symptoms of break-down, which finally became so serious that she was unable to continue with her house work. At about the same time she noticed a hard growth forming on the lower jaw, about one inch to the left and below the mental process. Thinking that some of the lower teeth might be the cause of the trouble, she consulted another physician, who referred her to me.

DIAGNOSIS.

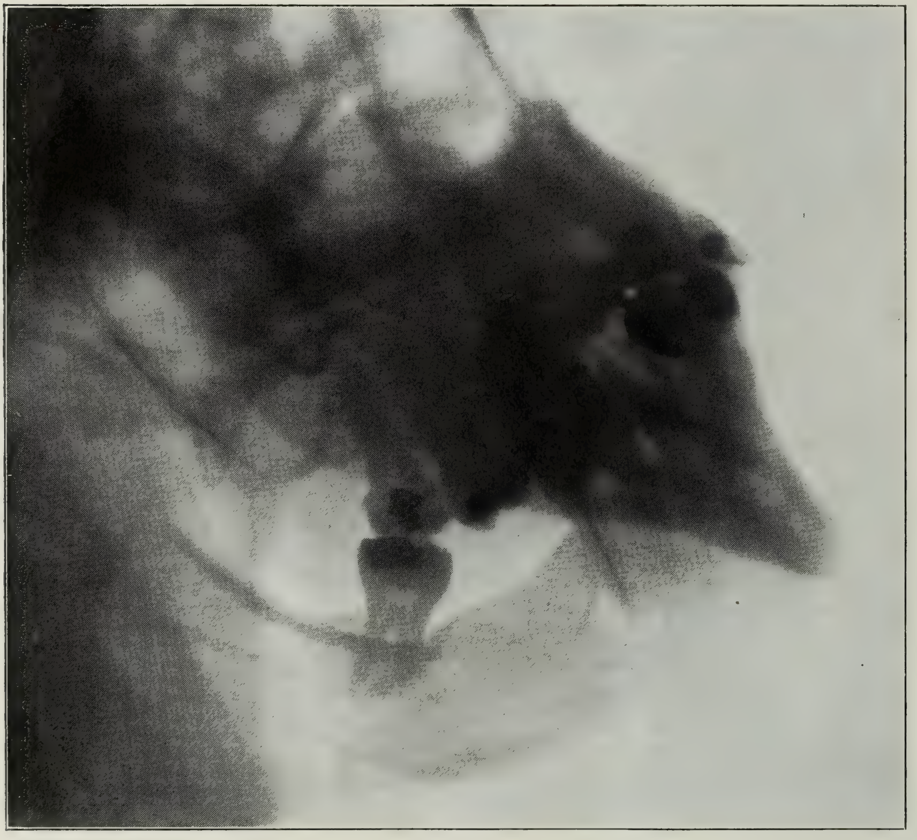
Upon examination, I was unable to detect any inflammation about the roots of any of the lower teeth, or any soreness that would indicate the source of the pain. The lower left lateral incisor, however, contained a gold filling, and appeared opaque upon transillumination. The patient was subsequently sent to an X-ray laboratory and secured skiagraphs of the right and left sides of the face. Fig. 1 shows necrosis of the process beneath the lower left lateral incisor, and Fig. 2 also necrosis of the process below the lower right second bicuspid.

TREATMENT.

Hot flaxseed poultices were applied over the indurated area every half-hour for twelve hours, when a lancet was passed to the process, and the lower left lateral incisor and lower right second bicuspid were extracted. A liquid antiseptic forced into the socket of the extracted incisor appeared on the face under the chin, proving that a fistula had been formed by the pus burrowing downward through the cancellated bony tissue.

Infection of the root apices of teeth lying beneath the line of insertion of the mylohyoid muscle may cause an abscess to open in the neck—a condition which might have developed in this case, if it had been allowed to progress farther. In treating such conditions, two objects must be kept in view: First, destruction of the bacteria present; second, stimulation of the tissue to produce healthy granulation.

FIG. 1.



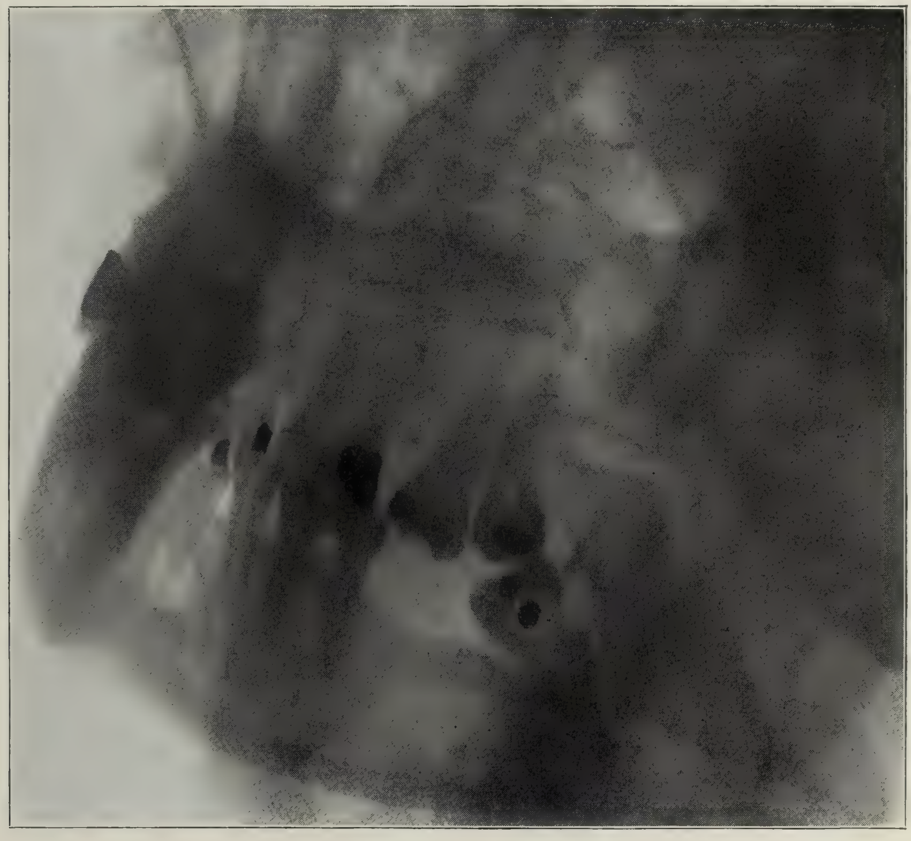
The abscess tract was washed with a solution of mercury bichlorid in hydrogen dioxid, 1:1000, followed by oil of creasote and tincture of iodin, 1:2. These solutions were forced through the abscess tract by fitting the nozzle of an alveolar abscess syringe to the tooth socket, packing temporary stopping around the nozzle. The temporary stopping is first laid in a 1:500 solution of mercury bichlorid for at least five minutes, dipped in boiling water, and then packed into the socket after inserting the nozzle of the syringe. The syringe and the instrument for packing the temporary stopping must be absolutely sterile, and the fingers must be kept from contact with the syringe nozzle and stopping. The sockets of the extracted teeth were packed with antiseptic gauze, and an antiseptic salve dressing was placed over the chin and held in position by adhesive plaster.

There was no fistula leading from the alveolus of the right second bicuspid. Similar treatment was applied as in the other tooth, except that distilled water was used instead of hydrogen dioxid. Hydrogen dioxid should never be employed in abscesses that have no fistulous opening, especially not in upper teeth, as the drug, when forced into the antrum of Highmore, causes severe pain and tends to spread infection.

The treatment indicated was continued daily for one week, then every third day, until the tissues had regained normal health. A 10 per cent. solution of silver nitrate was applied to stimulate granulation, and antiseptic gauze was packed into the abscess cavity, the quantity of gauze being gradually lessened until the cavity had nearly healed. The wound was then kept clean by applications of hydrogen dioxid, until complete closure had taken place.

After the fistula had healed, a binding-down of the tissues was noted along the border of the mandible, owing to the formation of scar tissue. This condition was remedied by the following operation:* By drawing the lip away from the alveolar wall, the exact position of the cord of attachment was ascertained. A tenotome was passed into the tissues, dividing the band of attachment. A long needle was then passed through the most depressed portion of the scar, the long end of the needle resting on the chin. Strips of adhesive plaster applied to the chin under the head and point of the needle prevented the latter's sinking into the soft tissue. The needle was allowed to remain several days, until the incision in the mouth had healed. The object of this

FIG. 2.



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* Black's operation, as described in (Inglis') "Burchard's Text-book of Dental Pathology and Therapeutics."

procedure was to supply a new section of scar tissue—which, while shrinking, increases the total length of the cord, hence produces less binding.

IMPORTANCE OF CORRECT DIAGNOSIS AND TREATMENT.

The seriousness of the situation in which this patient found herself justifies a few words on the vital importance of correct diagnosis and treatment. This woman was the mother of four small children; her husband's earnings were small, at best, and any inroad upon the family's income quickly assumed serious proportions. When this patient's health failed to such a degree that she could no longer perform her household duties, the family's condition became serious indeed. Our responsibility in such cases is so great as to demand a complete mastery of diagnosis and treatment, and an intimate knowledge of all the information obtainable on this subject. In many cases of greater or less seriousness than the above, the patients' health or ill-health rests with the efficiency of the dentist consulted.

Not long ago I had occasion to treat a young man who had been treated by a physician for neuralgia, and by an eye specialist for pains in the region of the left eye. Extraction of an impacted upper left third molar cured both neuralgia and occular trouble, the patient subsequently dispensing with eyeglasses and experiencing no further trouble.

IS THE DENTAL PROFESSION PREPARED TO ABANDON THE "D.D.S."?

By JAMES TRUMAN, D.D.S., LL.D., Philadelphia, Pa.

THIS question may seem to the majority of thinkers in the profession to carry with it its own answer, and that would be at once a negative one. The work this degree has done and the results obtained have been so extended and so beneficial in an educational sense that any thought of change brings a feeling of repulsion. It is true that dentistry owes to this title more than it ever can repay, but has not the time arrived when the dental profession must answer intelligently the query that heads this article? The writer holds to the opinion that all great changes in the world's work must be preceded by thoughtful consideration and discussion; sudden changes are but temporary in character, and, like the physical disturbances produced by the seismic shocks of the earth's surface, are simply the minor factors in the evolutionary progress of the physical as well as the mental life of the world.

ESTABLISHMENT OF THE D.D.S. DEGREE IN 1839.

The conditions existing in the dental profession about 1839, when Dr. Harris established this degree, are not sufficiently considered. That broad-minded man has never been given the honor which he deserved. To appreciate his work the reader must, in imagination, carry his mind back to the conditions existing prior to the establishment of the Baltimore College of Dental Surgery, and for a long time subsequent to that year. The "barber" period in dentistry was, while on the decline, still a power of ill to be reckoned with. The leecher and bleeder and extractor of teeth was not to be driven from his possessions without a struggle, and the establishment of a dental college was the danger signal to the calling, and naturally aroused violent opposition. Besides, the men who devoted all their intelligence to what was known as dentistry in the early period of the nineteenth century were not favorably disposed, as a rule, to the assumption that men could be taught dentistry by lectures and with, as at that time, a minor degree of practice. As far as is known to the writer, there was but little sympathy for the Harris movement among the few educated men who were in dentistry, and the opposition of the medical profession is well understood, having remained a stigma on that body to the present day, leaving among the narrow-minded portion of that branch of the healing art a prejudice which time has failed to moderate or outgrow.

Harris, when he adopted the degree of D.D.S.—Doctor of Dental Surgery—had evidently given it much thought, and in view of the exceedingly narrow conceptions of what properly constituted dentistry at that period was fully justified in limiting the degree to the work as it was then understood.

PAST AND PRESENT SIGNIFICANCE OF THE D.D.S. DEGREE.

In the evolution of the dental profession there has been developed a new range of ideas, and yet the old designation remains. It may with some degree of propriety be asserted that this applies with equal force to all degrees, and that the M.D. of a hundred years past could not represent the Doctor of Medicine of the twentieth century any more than the legal principles of the Romans represented the laws of today; and yet both, in their basic principles, were founded on unchangeable laws. This cannot be said to be equally true of dentistry.

The formulation of law is a slow, evolutionary process, and is not man-made: for all such statutes are the imperfect results of a still more imperfect development of the human mind.

The D.D.S. as it was understood by Harris was evidently an epitome of his judgment of the character of the dental profession and of the work accomplished up to that day. It meant that the man who essayed to work in the mouths of people must confine himself to treating the teeth. He was Doctor of Dental Surgery, and this meant, besides the extraction of teeth, care for the teeth, and, when necessary, provision for replacement of these organs. In this very narrow sense it covered as a degree all that was needed at that time: that it has ceased to meet all the demands of the present must be apparent to all who intelligently appreciate the changes effected in seventy-three years of educational progress.

PRESENT INADEQUACY OF THE D.D.S. DEGREE.

The D.D.S. degree no longer answers the requirements of the age. It never had an inherent right to live through all time and through all civilizations. It was a partial degree, and partial degrees can have but a limited life. The writer, with all those who have the right to use the title, clings personally and historically to this honorable badge, but he recognizes that it is the duty of each one to measure his life-work so as to meet the inevitable changes, and not to sit supinely at the feet of the fathers, no matter how these may be venerated.

The D.D.S. degree fails today to represent the progress of dentistry—which was originally confined to the teeth, but at present, while it embraces these, has extended its boundaries to the entire pathology of the mouth and adjacent parts. The educated practitioners decline the uniform of a decadent generation, and Magitot was right when he defined dentistry as stomatology—the science of the mouth, not a part of it. This is a word unchangeable, indicating for all time the professional labor allotted to this branch of the healing art.

RECOGNITION OF THE D.D.S. DEGREE AT HOME AND ABROAD.

The D.D.S. degree, if viewed simply as a title, cannot be said to have been specially recognized by legal enactments in this country either by the United States government or by any of the states of the Republic, but in all the states in which dental colleges are a part of professional education there are formulated laws for the incorporation of such institutions, and this incorporation carries with it the authority to confer the degree established by such educational bodies. The result has been that the D.D.S. has not been universally accepted. One college—Harvard—gives the D.M.D., and another the D.D.Sc. This fact demonstrates a certain dissatisfaction with the degree established by Harris, and therefore the necessity for uniformity of procedure must be apparent. This degree of Doctor of Dental Surgery is not recognized by any foreign country with which the writer is familiar, for the various governments have their own laws regulating dental practice, some demanding the medical degree and others giving a special training, with license to practice. The D.D.S. degree, however, like all degrees, carries with it a moral force that will help materially the practitioner, even though he be obliged to use simply his name, without addition. In illustration of what the writer means by the term moral force, this personal experience may be of value: When some thirty-five years ago he attempted to practice in one of the large cities of Germany, he was ordered to report to the chief of police. When he faced this august official, the latter politely informed him that he could not use the D.D.S. degree on any sign or card, but, he added: "If I need any dentistry, I will have you attend to it." This was the moral force of the title received in the United States, and a fine illustration of whipping the devil with many stripes and then following humbly his instructions. Moral force is valuable, but what our profession needs is a title that will be recognized as a professional standard the world over, qualifying the holder to practice the healing art regardless of special titles.

From recent advices it is learned that the use of the American degree of D.D.S. is prohibited throughout the German Empire. This leads to the consideration of what should constitute recognition, and this becomes more and more a problem, the solution of which will require the combined wisdom of many minds. The writer does not expect to do more than offer a few thoughts which may serve as a basis for suggestion in this direction, since this is a problem that each country must solve for itself with due consideration of all the constituent conditions surrounding it; and this country has certain difficulties that must be met and possibly conquered. This applies with almost equal force to all newly settled regions, and to a limited degree to all countries, old or new.

PROPORTION OF DENTAL SERVICE AND NUMBER OF POPULATION.

Dentistry cannot be called an overcrowded profession anywhere, for the supply of well-trained men has not kept equal pace with the demand, and this must be a factor in any judgment arrived at, and one of first importance in any opinion to be either of final or merely transitional value.

The writer has for years been impressed with the importance of the views which he has sought to enforce in the foregoing, and in order to arrive at just conclusions undertook some calculations in 1908 to satisfy his own mind as to the possibility of a change in our educational procedures. The first thought was that dentistry was being overcrowded, and that a higher educational standard was not only necessary but imperative. The result of these investigations was so disturbing to the opinions previously formed that he hesitated to give these calculations circulation through recognized channels. Since then, Dr. J. Morgan Howe of New York city has published similar calculations, which, coming from such a careful observer, leave no doubt that these two independent observations are, in the main, correct. The writer therefore feels justified in giving his own ideas upon the subject.

In order to arrive at a proper estimate as to the relative proportion of dental practitioners to the population of the United States, excluding Canada, he estimated from sources in his possession the number of dentists that were in that year in this country.

Without entering into the details of said calculation or the manner in which the conclusions were obtained, it may suffice to say that they were based on the possibility of work of a single practitioner in a day, and the number of patients that could possibly be waited upon in a year. As each individual patient will repeat his or her visits more than once, an arbitrary average had to be established. The conclusions arrived at correspond almost exactly with those reached by Dr. Howe, and these were quite positive that no dentist could wait on more than four hundred different patients in a year. If these two calculations, made independently, are worth anything, they prove beyond question that with some 40,000 dentists now practicing in this country—the writer estimated the number at 37,833 in 1908—only 16,000,000 of the inhabitants of the United States could be waited upon by the trained dentists residing there. This leaves some 78,000,000 people unprovided for, if the estimates made by the census authorities are approximately correct, *i.e.* that the present population is 94,000,000. Even if this number should be found to be incorrect at the next census, the residue of population that cannot have professional service is astounding. When it is recognized by all health officials that the health of any community is dependent on the care exercised in combating infection, especially such infection as is liable to enter the system through the oral cavity, it becomes of supreme importance that this large proportion of our citizens should be protected, and have adequate service. It must be evident that this care can be accomplished alone through a great increase in the number of educated practitioners.

The relative difference between dental professional service and population is perhaps more forcibly shown when two large contiguous cities, as New York and Philadelphia, are taken for illustration.

New York city—boroughs of Bronx, Brooklyn, Manhattan, Queens, and Richmond—had 1578 dentists, with 4,766,883 population in 1910. This gives over three thousand inhabitants to each dentist. It seems as though New York might, with signal profit to the community, expand its professional service.

On the other hand, Philadelphia, with its several dental schools, has lessened materially this disproportion between dental service and population. The number of dentists practicing there in 1910 was 992. The population that year in the built-up sections of the city was 1,491,082. This would give 1503 patients for each dentist. In this estimate no account is taken of the great number of patients who are waited upon by the dental schools, the demand for service in these schools being very heavy, and constantly increasing.

STANDARD OF PRELIMINARY EDUCATION.

Professional education seems to be undergoing a transitional period, and the question is constantly arising and has been the subject of much discussion for several years in both dental and medical circles: What should be the preliminary education to fit a young man properly for the study of these two callings? This has never been satisfactorily settled, and while some of the higher medical schools have adopted a full college course, or a certain proportion thereof, as a requirement for entrance, this practice has not been universal, hence much confusion exists in this branch of the healing art. The higher schools of dentistry have apparently settled down to the conviction that a four years' course in a high school, preferably a manual training school, is amply sufficient as a basis for the education of men for a stomatological practice. In the writer's opinion, the well-conducted high school furnishes a cultural basis sufficient for any profession. In most European countries the gymnasium is the foundation for subsequent work, and justly so, for the student in this school is better trained than the average man who receives the bachelor degree in American colleges. When medicine is chosen as the life-work this preliminary work must be supplemented with a full course. By the time this is accomplished the average intellect is quite unequal to the practical work required in dentistry, and the practitioner, with few exceptions, becomes a mere theorizer, of not much value to himself or to those whom he attempts to serve. The writer has no sympathy with this overloading of the educational systems. The young man should be trained to meet the bent of his mind. With some the full course of our higher universities is essential, and with others it will have a deterring force.

Dr. Carl R. Lindstrom of Boston, Mass., made these pertinent remarks in his address as president before the Massachusetts Dental Society, May 11, 1911:

> Do not think me impertinent if I call your attention to the fact that in the state of Massachusetts there are not enough dentists to care for all persons who need our services, if we worked every hour of the day. Why, then, should you and I try to put a greater limit on the output of dentists than is necessary? By so doing, shall we not increase the misery and suffering of our fellow citizens under the pretense of education?

The following passage is quoted from an address made by F. M. Webster before the Entomological Society of Washington, D. C.,* Professor Webster being connected with the agricultural department of that city:

> During the last twenty years, including the present, I have had with me between forty and fifty assistants, nearly all college and university graduates, and I tell you candidly I would not take another one fresh from school and with no further training, were I not obliged to do so. Indeed, this is true in general. All like college and university men—but after they have been made over elsewhere. Now, what is the matter? . . . .
>
> The university graduate is not suffering from too little instruction, but from too much of it. He has anywhere from fourteen to eighteen years of continuous miscellaneous instruction, and instead of his mind being clear and penetrating, it is more apt to be cloudy and befuddled. As Bacon puts it: "The education of the senses neglected, all after-education partakes of a drowsiness, a haziness, an insufficiency, which it is impossible to cure." The man from the university classroom is overloaded, not with what he needs, but with that which he does not require; he is afflicted with dyspepsia of the brain or mental indigestion and until he gets rid of these ailments, he is of little use.

The financial side of this educational problem creates no interest in the writer, although it sensibly affects university corporations. Quality and imperfection cannot be equally weighed in financial scales; better five men thoroughly trained than one hundred imperfectly.

The problem can alone be settled upon the principle of supply and demand. It must be evident that in the United States good dental practitioners have not equaled the demand for dental service, and hence large dental classes must prevail to meet the requirement, and until this be met, an increase of preliminary preparation or enlargement of the curriculum should be subjected to wise consideration.

THE FUTURE OF THE DENTAL PROFESSION.

The topics embraced in this article may not assume the importance in the minds of others which they possess in the writer's mind, but if the dental profession is at the parting of the ways, this subject should claim the interest of all active minds, for while the past record is secure, the future standing will depend upon how the present is arranged so as to insure satisfactory progress through the ages.

It would seem that this topic should engage the attention of the National Dental Association at its next meeting in Washington. It far transcends in importance cast gold inlays, for it is vital to the very life of the dental profession now and through all future time. The dental world would be deeply interested in a discussion of this topic by the national body, and the combination of ideas focused on this one topic ought to be of great value to those engaged in dental education. The latter are at present floundering in a sea of difficulties, with no safe land in sight. The time is not far distant when, by legal enactment, the dental colleges will be forced to advance to the medical degree. This will doubtless be regarded as preposterous in a free country, but the tendency of law today is to conserve the health of the people, and as one of the most important means to accomplish this end will be regarded thoroughness in professional dental educational systems.

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* *Science*, April 12, 1912.

The writer would heartily favor the degree of medicine for all dentists as the ultimate goal to be sought, but he realizes that this is impossible of attainment at the present period. To combine the two —dentistry and medicine—would mean for the individual student a six or seven years' course, carrying the young man to his twenty-fifth or twenty-sixth year before he could begin to practice his profession. We should aspire to the highest, but the approaches to the ideal should be exactly measured, and the difficulties anticipated and, if possible, provided for. Is the dental profession ready to prepare for the final advance?

CERTAIN SECTIONS OF THE HUMAN JAWS, MADE BY THE LATE DR. W. D. MILLER.

By RUSSELL W. BUNTING, D.D.Sc., Ann Arbor, Mich.,
LABORATORY OF DENTAL PATHOLOGY, UNIVERSITY OF MICHIGAN.

DENTISTRY through a long line of evolution has progressed from the realm of pure mechanics toward that of an exact science. It is no longer classed as a mechanical art, but is rated today among the leading professions, in just recognition of the strides which it has made in the effort to become of greater service to mankind. The advancement has been made along two general lines—first, that of investigation into the structure and function of the dental tissues and a close study of the pathological processes which occur in this region, and second, that of perfecting the methods of treatment of dental diseases and the repair of defects occurring as the result of such diseases. These two investigations have worked hand-in-hand to place the art of dentistry upon a scientific basis. It is to the first of them, however, that we owe our knowledge of the ultimate structure of the tissues with which we deal, and which is in reality the broad foundation upon which all the other advances have been made.

DIFFICULTIES ENCOUNTERED IN MAKING HISTOLOGICAL PREPARATIONS OF ORAL TISSUES.

When we look through our literature in review of the work which has been done along histological lines, we cannot but feel a pride in the character of the investigations made. Every tissue of the mouth has been sectioned and carefully studied by men who have given their lives to this work. Only those who have done work of this nature can realize the time and labor consumed in such investigations, and especially is this true in regard to the dental tissues. There are perhaps no tissues of the body which offer so many difficulties in their histological preparation as do those of the mouth. The enamel and dentin are the hardest structures of the body; they cannot be cut with a knife, but must be decalcified like bone. But in the process of decalcification the enamel, having no organic substance, is entirely removed, while the dentin, in its subsequent dehydration and embedding, becomes so tough that it is cut only with the greatest difficulty. Decalcified dentin does not stain readily. These objections have forced investigators to prepare their sections of teeth almost entirely by grinding them to an extreme thinness by the means of various abrasive substances. The process of grinding, also, is attended with many difficulties, in that a section of a tooth, to be of much value, must be thin enough for microscopical study, and must be intact in its entire periphery. Various methods of embedding and mounting have been used to keep the preparation intact while grinding, and many of them have given very excellent results in small pieces or single teeth.

Practically all of the study of the enamel, dentin, and cementum has been done by means of ground sections, but this method has not been applied to advantage with the soft tissues. Sections of the pulp, the pericementum, the gums, and the alveolus have been made almost exclusively by the decalcification method and sectioning on the microtome. Even with its disadvantages, many observers have attained a technique with the decalcifying method which enables them to produce sections of jaws and teeth *in situ* which are very instructive. Their sections are, however, devoid of enamel in every case, and the dentin takes the stain very poorly indeed.

DR. W. D. MILLER'S SLIDES.

In a collection of slides which Dr. W. D. Miller brought to this country and deposited in the pathological laboratory of the Dental School of the University of Michigan just previous to his death, there were found a number of large ground sections of the teeth of the larger mammals, together with a series of twenty sections of human jaws containing teeth. These sections had not been decalcified, but had been ground through hard and soft tissues alike, each being retained intact in its position. Inasmuch as these slides are beautiful preparations of unusual interest, and as to my knowledge they have not been published heretofore, it seemed wise to attempt to reproduce them as accurately as possible, in order that they might be of service to the profession at large.

The only information which we have regarding the preparation of these sections is that which is given by Dr. Miller in an article appearing in the October issue of the DENTAL COSMOS for 1901. In this article he says:

> In preparing the jaw for grinding horizontal sections, the teeth are first ground or sawed off on a level with the margin of the alveolar process, and then two sections of the process, each about one-quarter inch thick, cut off with a fine saw. These sections are then placed in the hardening fluid for a length of time depending upon the rapidity with which the fluid acts, or until the soft tissues are completely hardened. For hardening I . . . use either absolute alcohol, Müller's fluid, formalin, or a mixture of ten parts of formalin to ninety parts of Müller's fluid.
>
> Sections hardened in Müller's fluid should be left in running water for several hours, or over night; afterward in dilute alcohol, then absolute alcohol, and finally in a mixture of equal parts of absolute alcohol and ether in succession, in the usual manner preparatory to embedding in celloidin. The more thoroughly the tissue is dehydrated, the better the result will be; it should accordingly be left for about a week in absolute alcohol, and the alcohol changed daily. The same applies also to the mixture of ether and alcohol. It is then brought into a large quantity of a thin solution of celloidin, which is allowed to evaporate very slowly, so that at the end of three or four weeks the celloidin has become hard. When sufficiently hard, it is fastened to a block of wood, roughened on the surface, by means of a celloidin solution, and then taken to an ivory-turner, who cuts it up into sections about ½ to 1 mm. in thickness, which may then be ground down to the desired thinness on a large corundum stone.
>
> More recently, on the suggestion of Dr. Kirk, I have tried the acetate of amyl as a substitute for alcohol and ether for dissolving the celloidin. The solution, on gradually thickening, at first takes on a syrupy consistence; then gradually becomes more and more sticky (gluey) and finally tough, almost horn-like, and semi-transparent.

Ground transverse sections of the jaw with longitudinal sections of the teeth may be obtained by sawing the jaw into sections, each containing one tooth, and then grinding the section down on both cut surfaces sufficiently to slightly expose the pulp, when it should be placed in the hardening fluid, afterward to be impregnated with celloidin and ground as described above.

To obtain sections parallel to the lateral surfaces of the jaw, a jaw should be chosen in which the molars, bicuspids, and canines lie as nearly as possible in the same plane. The jaw is sawed in two between the canine and lateral incisor, and the sections ground down from both surfaces until the pulps of the several teeth are slightly exposed, when the preparation may be treated as above.

FIG. 1.

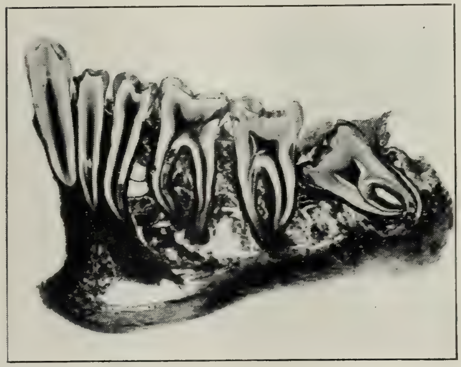


FIG. 2.

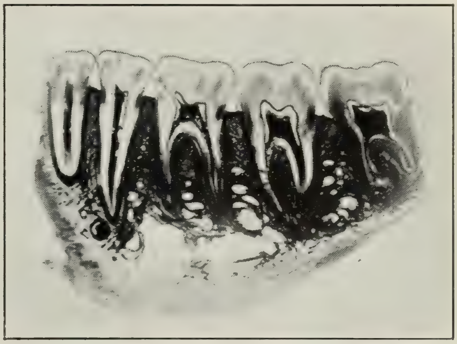


FIG. 3.

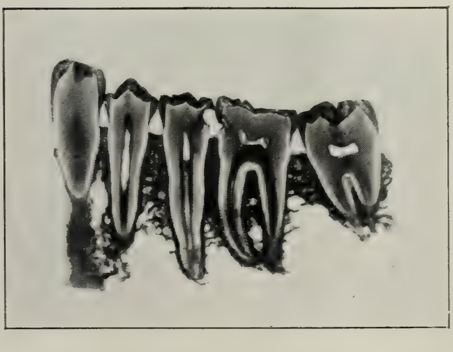
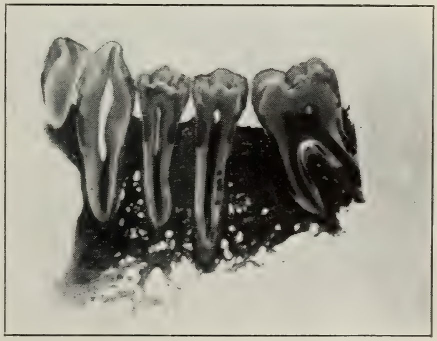


FIG. 4.



After Dr. Miller had ground the sections by the above method, he treated them with a variety of stains. Various combinations of eosin, triacid, thionin, picrocarmin, picric acid, acid fuchsin, and hematoxylin were used, producing some very beautiful selective stains. The sections were then mounted in balsam.

These finished preparations are very beautiful indeed, and represent a great deal of time and labor. To show how much Dr. Miller valued the sections, it may be said that he carried them in his hand *en route* from Germany to this country, scarcely allowing them to be out of his sight. Although they are not thin enough for close microscopical study, still for a macroscopical study of the soft and hard tissues *in situ* they are invaluable. The reproductions which have been made from the specimens are photographs of the exact sizes of the original specimens, made with a Zeiss apparatus, with the employment of the Zetnöff ray-filter for neutralizing the colors. Although the reproductions are of one color, the differentiation of the various tissues is quite clear, and in many instances they are as instructive as their corresponding originals. The specimens have several features of especial interest, among which are the relation of the teeth to each other, their point contacts, the various stages of interproximal caries, abrasion, the direction of the root-canals, the alveolus and its relation to the teeth, and the results of abscesses and extractions as seen in the bone, many of them being brought out very clearly and in a manner which is individual to these sections.

Fig. 5.

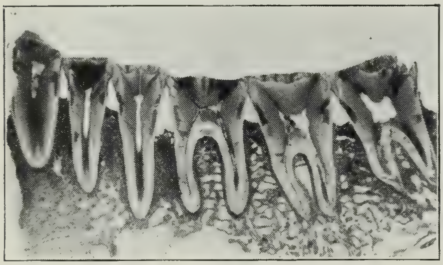


Fig. 6.

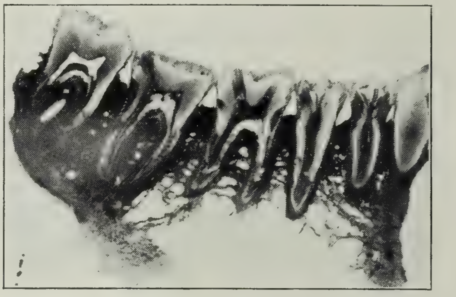


Fig. 7.

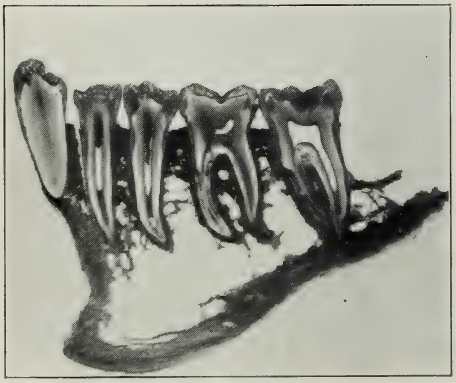


Fig. 8.

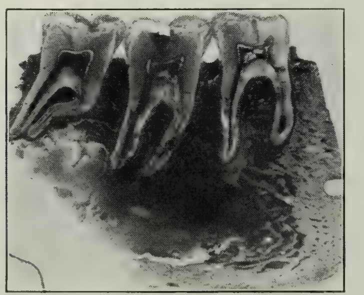


Fig. 1 is a very beautiful section of the lower jaw, embracing all of the teeth from canine to third molar. The malposition of the third molar is seen, and the distal surface of the second molar shows signs of beginning caries due to the pocket formed by the third molar. Interproximal caries is shown in an early stage on the mesial surface of the second molar and the distal surface of the first molar. The root-canals of the second bicuspid and the mesial root of the first molar are seen to have sudden turns in their lower third. The bone has been mutilated somewhat in grinding, but we can see that the lower border of the ramus consists of cortical bone, while the inner portion is cancellous, arranged in trabeculæ giving support to the teeth.

Fig. 2 is a section of the lower jaw embracing three molars and two bicuspids. On account of its extreme contrast in stains, this preparation was difficult to reproduce. Although the enamel is not well shown, the picture of the bone structure and its relation to the teeth is very clear. The teeth are perfect, no evidence of caries being seen.

Fig. 9.

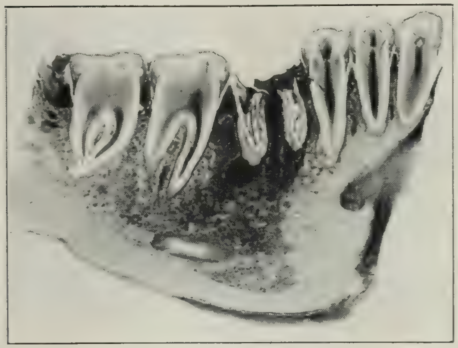


Fig. 11.

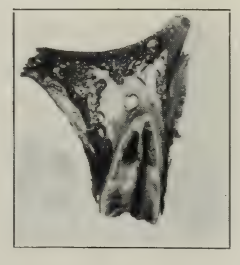


Fig. 3 is a section of the lower jaw, including two molars, two bicuspids, and a portion of the canine. A large part of the bone has been lost in the grinding. Interproximal caries is seen in the first molar and second bicuspid, and a beginning caries on the occlusal surface of the second molar. The first molar has suffered considerably from abrasion, and the pulp is partially filled with secondary dentin in consequence.

Fig. 4 is a section of the lower jaw through the first molar, the two bicuspids, the canine, and a portion of the lateral incisor; the lower portion of the ramus has been lost. The teeth seem to be perfect.

Fig. 10.

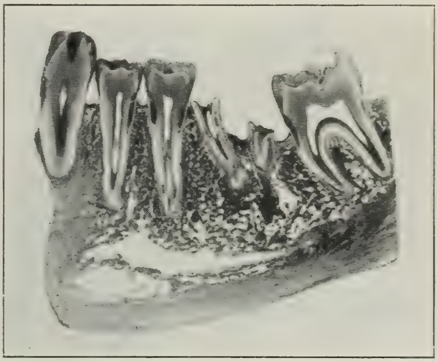
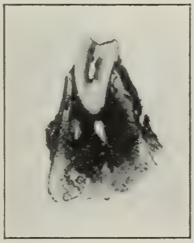


Fig. 5 is a section of the lower jaw in which the arrangement of the bone trabeculæ is very clearly seen. The teeth have been extensively abraded; the first molar, having lost all the enamel on the occlusal surface, has built-in secondary dentin in compensation, until the pulp cavity has almost been obliterated.

Fig. 12.



Figs. 6, 7, and 8 are all sections of the lower jaw, with teeth which are nearly perfect. Fig. 6 has a slight abrasion on the first and second molars, and a transparency of the dentin is seen beneath the injury, while in the pulp-chamber of the second molar a stone has been formed. Figs. 7 and 8 show some caries.

FIG. 13.

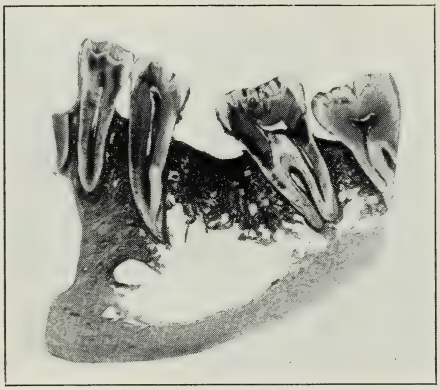


Fig. 9 is a longitudinal section of a lower jaw containing seven teeth. Of these the first molar is seen to be badly decayed, having lost its crown, the roots only remaining. The appearance of the bone about the roots, which have been exfoliated toward the surface, shows clearly that the tooth had suffered from an apical abscess. The bone is seen to be necrosed and infiltrated for a considerable distance about the roots.

FIG. 15.

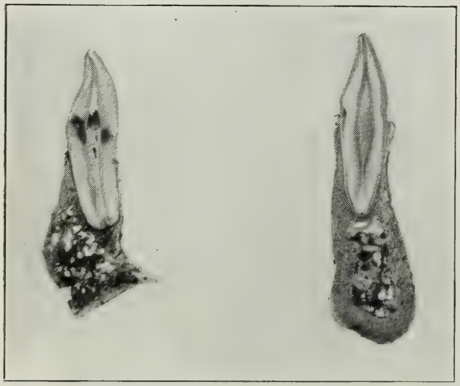


Fig. 10 is a similar case, but there has not been as much infiltration or necrosis as in the preceding section.

Fig. 11 is a bucco-lingual longitudinal section through an upper bicuspid root. The crown of the tooth has been lost by caries, and the bone about the root has been involved by an apical abscess. In the original section it appears as if the area which had undergone necrosis was being reorganized by new granulations.

FIG. 14.

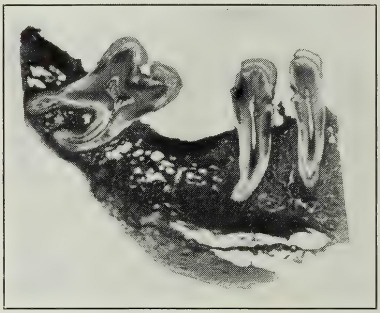


FIG. 16.

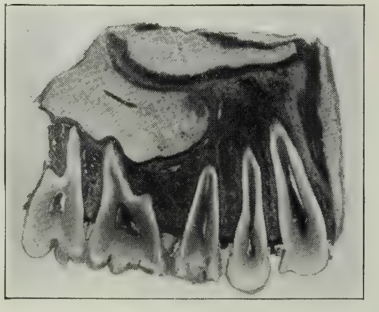


Fig. 12 is a similar section of a root in the lower jaw. In this the bone still seems to be necrosed, and no granulations are apparent.

Fig. 13 is a section of the mandible

through two molars and two bicuspids, the first molar having been lost. The alveolus is entirely obliterated, and has been replaced by bone which is similar to the normal. The two molars have drifted forward, and normal bone has been laid down distally as they moved. The bicuspids have not fallen back distally, but have maintained their positions.

Fig. 14 is a similar section in which the first and second molars have been lost, and the third molar has drifted mesially, while the bicuspids have remained in position. The bone which has replaced the alveoli and that which has been laid down distally to the moving third molar is seen to be somewhat more cancellous than the surrounding tissue, but otherwise is normal.

Fig. 15 shows two sections made longitudinally through an upper and lower incisor respectively in a labio-lingual plane. These sections show very clearly the normal relations of these teeth to the bony process, and are perfect in every respect.

Fig. 16 is a longitudinal section of the upper jaw, including two molars, two bicuspids, the canine, and a portion of the antral cavity. The relations of the buccal roots of the molars to the antrum may be seen, and a spicule of bone is shown which, partially at least, divides the antrum into two cavities.

Fig. 17 is a cross-section of the upper jaw of a child made at about the junction of the upper and middle thirds of the roots. It contains all the deciduous teeth of that jaw and the first permanent molar on each side.

Fig. 17.

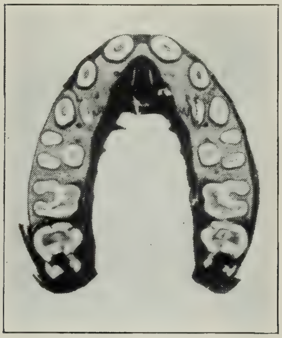


Fig. 18.

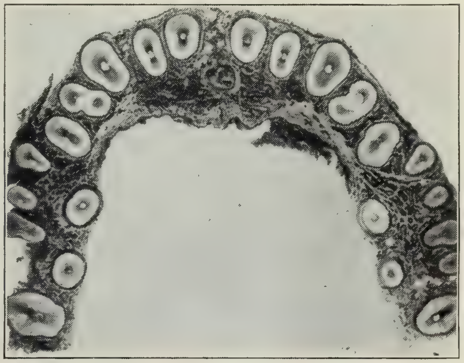


Fig. 18 is a similar section of the upper jaw of an adult made somewhat lower down on the roots. A decided difference in the bony structure of the two jaws will be seen, and the relations of the roots of the teeth to each other and the process is very clearly shown.

This explanatory *résumé* of the sections is by no means complete, but is intended simply for pointing out some of the more salient features, in order that they may be more clearly understood. It is to be hoped that others will master this technique, and will add to the collection which Dr. Miller had begun.

THE BEGINNINGS OF DISEASES OF THE PERIDENTAL MEMBRANE, AND THEIR PREVENTION.

By ARTHUR D. BLACK, M.D., D.D.S., Chicago, Ill.

(Read at the union meeting of the Seventh and Eighth District Dental Societies of the State of New York, Buffalo, November 9, 1911.)

A GRADUALLY increasing interest during the past ten years in the relationship of operations on the hard tissues of the teeth to the soft tissues adjacent has led me to make a closer study of the conditions which prevail in the mouths of people who have come under my observation. A careful record has been kept of many cases, and the facts noted have been rather startling, sufficiently so to convince me that the profession has been generally overlooking the most common etiological factors in the consideration of diseases of the peridental membrane. I do not wish to convey the impression that my records have brought to light any really new conditions, but they have served to establish beyond question the fact that the profession has little realization of the direct relationship between the inflammations which are the actual beginnings of diseases of the peridental membrane and those diseases themselves. This might be stated differently by saying that we have not recognized the inflammation at all until there has been an actual detachment, usually an irreparable injury, of the peridental membrane. When I say we have not recognized these inflammations, I do not mean that we have not seen them; we have seen them but have not associated the two as cause and effect, and have not instituted treatment until the time has passed when there was a possibility of restoring normal conditions.

As a result of the examinations and tabulations which have been made, I do not hesitate to make the statement that fully ninety-five per cent. of all persons who apply regularly for dental service have present in their mouths in some location conditions which constitute the principal etiological factors of peridental inflammation. Nor do I hesitate to say that the very large majority of this ninety-five per cent. are dismissed without the correction of many of these conditions. If I should say that nineteen out of every twenty patients have in their mouths conditions which are associated with peridental inflammation as cause and effect, and that the majority of these conditions can be easily remedied, but that the dentist is neglecting to do so, I presume this statement would be resented. In reply I would only ask you to convince yourselves by making a careful study of the actual conditions present in the mouths of your patients.

If an historical sketch should be prepared covering the treatment of almost any disease, it would be found that the earliest treatment was largely experimental and based on the particular symptoms presenting at the moment, there being at the time no definite knowledge of the pathology nor of the sequence of symptoms and their relation to conditions, and generally little or no knowledge of the etiology. Experimental treatment developed, by exclusion, into a more or less definite routine—empirical treatment, still without much knowledge of pathology or etiology. As time passed, there gradually developed as the result of study and closer observation by many men, a definite knowledge of both etiology and pathology. This in turn indicated a rational and scientific treatment based on a proper consideration of signs and symptoms in relation to pathology, etiology, and the physiological functions of the tissues or parts involved. Further investigations into the etiology have led, for many diseases, to the more direct application of the treatment to combat the etiological factor, as in the use of vaccines and antitoxins; and for some the treatment has become truly and positively preventive, by the destruction or eradication of the cause, as illustrated by improvements in sanitation to prevent typhoid fever, and the eradication of the mosquito to prevent yellow fever, etc. The development of our knowledge of any disease tends to gradually apply treatment closer to the source. Many important etiological factors are often entirely overlooked at first, although they may be very apparent to most observers after they have been pointed out and properly associated with the condition.

The treatment of pathological conditions of the peridental membrane is following a similar course. Since the condition was first recognized, many guesses, theories, and suppositions as to its etiology have been presented, and every imaginable treatment has been tried. Study and careful clinical observation have gradually established many facts as to the etiology and pathology, researches in histology and cellular physiology have shown the physiological function of the tissues involved, and the treatment has been gradually modified and simplified to correspond with the advances made in our knowledge of conditions. Until recent years, treatment has been palliative rather than preventive.

Our knowledge of the physiological functions of the peridental membrane, and especially its relation to the cementum, is of the greatest importance in determining the treatment; it should convince us that we will never combat this disease successfully on any other plan than that of preventive treatment. If any portion of this tissue is detached from the cementum long enough for those portions of fibers within the cementum to lose their vitality, we know that repair—restoration to normal by the re-attachment of the fibers to the tooth—may not be brought about; in order to be successful, therefore, treatment must be instituted before detachment has occurred, and if it be applied thus early, then those inflammations which precede detachment must be recognized. We must also recognize and correct those conditions of the hard tissues which are liable to cause these inflammations.

In this paper, three local etiological factors will be considered. It is recognized that the general systemic condition will have its influence in any of these conditions, yet for the purpose of this paper such conditions need not be considered; we will look rather at local conditions, which may be readily observed clinically. The three factors referred to are (1) deposits of salivary calculus, (2) deposits of serumal calculus, (3) injuries to the interproximal gum septum on account of lack of contact or of improper contact of teeth. This paper will be confined to the consideration of these three causes, for the reason that they are considered to cover the very large majority of all cases.

DEPOSITS OF SALIVARY CALCULUS.

We are all familiar with the clinical appearance of salivary calculus, and the destruction of the gingivæ, the peridental membrane, and the alveolar process by the gradual accumulation of this material. It is readily recognized as the causal factor in a considerable percentage of cases of peridental inflammation. A better knowledge of the conditions necessary for the deposit to occur should be our guide in treatment for the prevention of its occurrence. In this connection I wish to call special attention to a paper read by Dr. G. V. Black before the Second District Dental Society of the State of New York last January.* In this paper several new facts were presented relative to the conditions under which deposits occur, how deposits may be controlled, and how they may be prevented by the patient.

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* "Beginnings of Pyorrhea Alveolaris—Treatment for Prevention," *Items of Interest*, 1911, vol. xxxiii, p. 420.

The facts, briefly stated, are that for a deposit of salivary calculus to occur there must first be deposited on the hard substance within the mouth what is termed an agglutinating substance. This substance is transparent, and is slightly sticky. This serves to gather and hold particles of calcium salts which are precipitated from the saliva. From the viewpoint of prevention it is of the utmost importance that we appreciate the fact that this agglutinating substance may be readily and completely removed from the teeth or a plate with an ordinary tooth-brush and plain water, if it is not allowed to remain in position more than about twelve hours, but that it cannot be so removed a little later, after a slight layer of calcium salts has been deposited, and the whole mass has become hard. Here, then, is the guide to success in preventing these accumulations. It cannot be done by the dentist; it must be done by each patient for himself, and this can only be positively accomplished by thorough brushing twice each day. Nothing more than a tooth-brush and plain water are necessary, but success may be attained only by their use twice every day. To miss brushing a single day during a period when such deposits are being formed means that a thin layer which the brush cannot remove will have been deposited, and each day of neglect means additional accretions. I have found that the explanation of this simple fact has awakened in many patients an interest that has resulted in the prevention of deposits. It puts the question of the saving or the loss of the teeth clearly in their hands, and under such circumstances we have a right to expect better care by many people.

Another interesting fact brought out in the paper referred to is that the deposit of salivary calculus may be controlled to a considerable extent by the diet. Eating too much causes deposits; a saline cathartic will result in a cessation of deposits for a week or more; one who eats moderately and fletcherizes will not have deposits. The kind of food eaten seems to have little to do with the deposits; it is rather the quantity.

The preventive treatment, then, for cases of peridental inflammation caused by deposits of salivary calculus should be —(1) Thorough removal of all deposits by the dentist; (2) information to the patient as to the relation of diet to these deposits and as to the nature of the primary agglutinating deposit which may be easily removed with brush and water if not more than twelve hours old, also as to the secondary deposit of calculus which cannot be removed with a brush; (3) careful instruction to the patient in the manipulation of the brush, and (4) sufficiently frequent visits of the patient to the dentist to enable him to remove deposits that may occur through neglect by the patient.

DEPOSITS OF SERUMAL CALCULUS.

There are two principal locations in which we find deposits of serumal calculus; first on the enamel under the free margin of the gum, without detachment of the fibers of the peridental membrane at the gingival line, and second upon the roots of teeth after the peridental membrane has been detached. We will consider only the first group in this paper, as the second group should be considered under palliative rather than preventive treatment. We find deposits of serumal calculus on the enamel, under the free margin of the gum, in many cases in which there has been no noticeable inflammation of the gingivæ. After the deposit has occurred, however, it usually causes sufficient irritation of the overlying soft tissue to produce a noticeable inflammation. This is not recognized with sufficient regularity clinically. The gingivæ overlying such deposits are usually of a deeper red or bluish color; often in the form of a small spot exactly over the deposit. As the quantity of deposit increases, the spot enlarges, until there may be a considerable area of inflammation. Similar deposits occur in cases in which the gingivæ have become inflamed from some other cause, such as a rough overlapping gingival margin of a filling or the crowding of food between the teeth where the contact points have been lost.

The treatment of the deposit of serumal calculus should consist of thorough removal before the inflammation has involved the peridental membrane, careful washing of the subgingival space with nothing more than plain water or normal salt solution—no drug whatever to be used—subsequent brushing of the gums by the patient twice daily, and in cases of early recurrence the use of a syringe by the patient for daily irrigation of the subgingival space, as described in the article by Dr. G. V. Black referred to previously.

INJURIES TO THE INTERPROXIMAL GUM SEPTUM.

We now come to the group of conditions the study of which led to the preparation of this paper. That the injuries to the interproximal gum septum constitute the beginnings of the very large majority, probably three-fourths, of cases of peridental inflammation there can be no doubt in the minds of those who have made careful records of the conditions prevailing in the mouths of those of our people who are under the watchful—or shall I say the blind—care of the members of the dental profession. I wish to confess that I had no realization of the conditions existing until I began to record my observations. I have stated previously in this paper that ninety-five per cent. of all persons who apply regularly for dental service have present in their mouths in some location conditions which are causes of peridental inflammation. By this statement I mean to say that there will be found in these mouths one or more contacts that are not right, that there is a condition which is causing at the time, or which may and which generally does cause an inflammation of the interproximal soft tissue, which in turn involves the peridental membrane. The most important of these conditions are:

(1) Lack of contact of the teeth. This may be due to the separation of two teeth on account of the extraction of a neighboring tooth, or possibly on account of some other disturbance to the occlusion, or to deposits of serumal calculus in the subgingival space. It may be due to a failure by a dentist to build a filling or crown to proper contour. Under any of these conditions the interproximal gum tissue will be injured and inflamed as a result of food being forced between the teeth. One exception should be noted—when the teeth are a considerable distance apart so that food is not held between them, there will usually be no inflammation.

(2) Improper contact of the teeth. An improper contact of the teeth is usually as injurious to the septal tissue as a lack of contact. If there is too broad a contact of two teeth due to malposition of a typical form, food débris will often be caught and held between the broad contact and cause inflammation of the soft tissue. Likewise, if the contacts are worn flat by the bucco-lingual motion of the teeth in their sockets, the result may be the same; or if a filling or a crown has either a broad or a rough surface in contact with the proximal tooth, a similar condition will be produced. There is another type of improper contact which is often overlooked; the teeth are really in proper contact, but owing to a laxity of the peridental membrane of one or both, do not remain in contact under the force of mastication. Under pressure, they move apart enough to permit food débris to be forced between them. This condition will be observed most often between second and third molars, the third molar moving distally when the jaws are closed in chewing.

(3) Injuries caused by the misuse of the toothpick, ligature, or too stiff a tooth-brush, without regard to the condition of the contacts. Occasionably cases are seen in which a person has repeatedly forced a wooden toothpick through one or more of the septal spaces, from buccal to lingual, just to the gingival side of the contact point, and has thus caused the absorption of the crest of the septum. This injury permits of occasional lodgments of food, which enters the space from the buccal or lingual side, the contact being in good form. Eventually there may occur sufficient inflammation to cause a looseness of the contact so

that food is forced through in mastication. If a ligature is frequently snapped through the contact, the injury to the gum septum may be similar. I have seen very few cases, of only two of which I have made definite record, in which the gum septa have been inflamed by the use of too stiff a tooth-brush. In both cases there was marked improvement promptly following the change to a softer brush.

As to the frequency of these conditions, a series of examinations made last year may be reported. The mouths of eighty members of the senior class of the Northwestern University Dental School were examined, and careful records made of the findings. These students averaged about twenty-five years of age. Of the eighty, but five had all contact points in good form and no inflammation of the gum septa. In the mouths of the other seventy-five there were found 319 contact points which were not in good form, and in the large majority there was inflammation of the septal tissue. In 207 instances the teeth were not in contact; in 77 there were too broad contacts of fillings or crowns, in 29 the contact had been lost by caries of one or both teeth, and in 6 the contact points were worn sufficiently to allow food lodgment. In the seventy-five mouths there was an average of 4.25 bad contact points per mouth. These patients were practically all young men. My observation of practical cases leads me to the belief that this percentage is less than the general average.

In my practice I have been keeping careful records of these conditions. I have kept for each filling operation a record of the condition which made the filling necessary. A review of my record of proximal fillings placed from January 1st to November 1st of this year shows that a little over thirty-five per cent. of these operations, including both new fillings and refillings, have been placed because of lack of contact or of improper contacts. This percentage applies only to cases in which fillings were made, and does not include a considerable number of cases in which the occlusion was modified to tighten contacts, nor does it include a very large number in which previous fillings with too broad contacts were trimmed to proper form, and new fillings were not required. In making an estimate of conditions existing, there should also be added to the above a good many contacts which were tightened by operations on neighboring teeth, viz, cases in which two or more contacts were tightened by a single filling. When all of these conditions are given careful consideration, one cannot fail to be impressed with the fact that the large number of cases presenting in which previous filling operations must be remedied, or in which conditions calling for treatment to protect the gum septum have been neglected, is a bad reflection on our work as professional men. I have during this year replaced or repaired more proximal fillings in the bicuspids and molars for the purpose of protecting the interproximal gum septum than I have altogether for recurrences of caries due to lack of extension in cavity preparation, to failures in adaptation, to failures in condensation, and to bad margins of fillings.

In the examination of the mouths of our patients, it would seem to be the most logical order to examine the soft tissues first. This should include an inspection of the entire mucous membrane of the mouth, which can usually be made at a glance. This should be followed by a more careful examination of the gingivæ and interproximal gum septa. I have already referred to the deep red or bluish spots which indicate deposits of serumal calculus in the subgingival space. When there is an inflammation of the interproximal gum septum, there may be considerable variation in the symptoms. The septal tissue may be of normal or nearly normal contour, and the only symptom may be a slight discoloration. The most constant symptom is this discoloration. There may be slight or considerable swelling, and the inflamed tissue will bleed freely on irritation. Oftentimes particles of food will be found packed between the teeth, and as a result the gum septum will be depressed in the center, and will be forced out to the buccal and lingual sides. After food impaction has continued for some time, the septum will undergo absorption. There is no limit to the extent of this absorption; the entire septal tissue may be destroyed, as may be also the peridental membrane and interproximal alveolar process.

When there is the slightest discoloration of the septal tissue, an investigation should be made to find the cause. It will usually be found that the contact is not right. The condition of the contact can generally be determined by the use of a waxed silk ligature. The fingers which hold the ligature should be close to the teeth, and care should be taken that it does not injure the gum septum if it snaps through the contact. If the contact is not sufficiently tight, the ligature will of course pass through easily, requiring very little force. If the surface of either tooth is rough, or if a filling is not properly finished, the ligature will usually be frayed or cut; if the contact is too broad, it will drag as it is forced through. In testing contacts, the ligature should be passed from occlusal to gingival, and then the two ends should be held parallel in the direction of the long axis of the tooth. The distance between the parallel strands will indicate the bucco-lingual width of the contact. The two ends should then be held parallel in the buccal direction, at right angles to the long axis of the tooth; this will indicate the width of the contact in the occluso-gingival direction. In either direction the parallel strands should not be more than one and one-half to two millimeters apart. Occasionally it will be necessary to place a separator and move the teeth apart a little to determine the exact condition with which we have to deal.

When there is inflammation of this tissue and the contact is found to be in proper form, we should then suspect an injury by deposits of serumal calculus, or by the improper use of the toothpick, ligature, or brush. In the two cases mentioned in which too stiff brushes had been used, the contacts were in excellent condition, but almost every interproximal gum septum was of a very dark red color. The portion of the gingivæ on the buccal and labial sides of the teeth was not inflamed. I assumed that these patients, in using hard brushes, had kept them away from the soft tissues except as the septa would be reached in brushing the buccal and labial surfaces of the teeth. I selected softer brushes, and directed the patients to brush the gums thoroughly, but not vigorously enough to be painful, and within a couple of weeks the inflammation had disappeared.

The symptom of pain or discomfort is a very uncertain one as related to inflammations of the gingivæ, and especially to impaction of food between the teeth. Some patients will complain of so much discomfort and actual pain that they are unable to continue a meal until the impacted food has been removed, while others will present with a dozen or more spaces filled with food débris, and will insist that they have not experienced the slightest discomfort.

The proper treatment of all of these cases is the establishment of conditions by which the continued irritation of the interproximal gum septum will be prevented. This means that we must maintain proper contacts, that we must maintain the full mesio-distal width of the interproximal space. The importance of preserving the full width of this space does not seem to be fully appreciated. Careful observation will show that there is normally a tolerably definite mesio-distal width of this space in relation to the length of the gum septum. The space must be of normal width to give proper support to the crest which is to withstand the pressure of food passing through the embrasures. It will be observed that the width of the space between the anterior teeth is considerably less in proportion to the length of the septa than that between the posterior teeth. This is compensated for, however, by the incisal curvature of the gingival line, which very materially increases the support to the crest of the septum.

PROCEDURES IN BUILDING AND MAINTAINING PROPER CONTACT POINTS.

In the building and maintaining of proper contacts, the procedures are so varied that it may be best to consider the most important by number:

(1) When one or more contacts are found slightly open, a little grinding of portions of the occlusal surfaces of the teeth in the immediate neighborhood will often result in the movement of the teeth to close the contacts.

(2) When there is too broad a contact of a filling, a separator should be placed and the filling trimmed to proper form. Crowns, other than gold shell crowns, may be similarly trimmed.

(3) If there are proximal fillings which do not make contact, but are otherwise good, cavities may often be cut in such fillings and they may be built to proper form.

(4) Proximal fillings which cannot be brought to proper form by either of the above methods should be removed and replaced, whether or not they be good fillings otherwise.

(5) If there is a slight opening of the contact between two teeth which present neither cavities nor fillings in their proximal surfaces, a cavity should be cut in one of these teeth, and a filling placed to make proper contact.

(6) It should be remembered that two or more contacts may often be tightened by the use of the separator and the building of one prominent contact. For example, if a case should present in which the contacts between the two bicuspids, between the second bicuspid and first molar, and between the first and second molars are slightly open, these might all be tightened by the placing of a mesio-occlusal filling in the first molar. It will not often be found necessary to cut a cavity in a non-carious tooth.

(7) In placing proximal gold fillings, in practically every case slight separation should be secured; preferably a mechanical separator should be used at the time of the operation, in order to gain space for the proper trimming and polishing of the contact.

(8) The gold forming the contact of gold fillings should be very thoroughly condensed to prevent the contact from wearing flat.

(9) In making gold inlays, either the entire inlay should be cast of an alloy which is considerably harder than cast pure gold, or else the contact should be of solder, attached after the inlay is cast. Cast pure gold will not maintain proper contact form in many mouths, but will wear flat.

(10) In placing proximal amalgam fillings, a matrix and separator must both be used when the filling is placed, and the separator must be again applied when the filling is polished at a subsequent sitting, if a proper contact is to be obtained.

(11) Care should be taken to have no excess of any filling or inlay at the gingival margin. An excess not only causes inflammation of the soft tissue, but weakens the support of the crest of the septum.

(12) In the preparation of roots for crowns, there should be the least possible injury to the attachment of the peridental membrane at the gingival line. We should determine, with a blunt-end explorer, the position of the gingival line of each tooth all the way around, before cutting the tooth down.

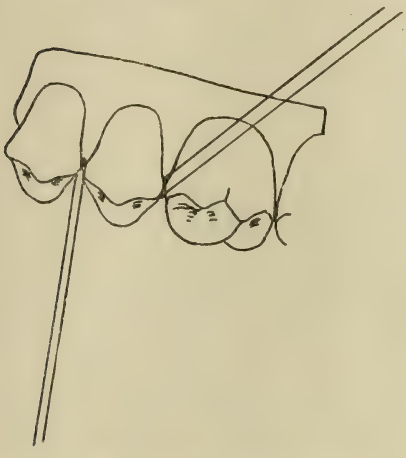
(13) If a band crown is to be used, care should be taken that the band does not impinge on the peridental membrane at any point.

(14) Previously placed crowns which are causing or permitting inflammation of the surrounding soft tissues should be removed and replaced, if it is impossible to remedy them otherwise. In some cases cavities may be cut in crowns and fillings placed, or fillings in proximal teeth may be built out to make sufficiently good contacts with crowns.

(15) In the limited number of cases in which contacts cannot be maintained owing to the continual movement of one or both teeth, it will occasionally be the best treatment to extract one tooth in order to save the others. Such a condition most frequently presents between the upper second and third molars, the third molar gradually moving distally, or being

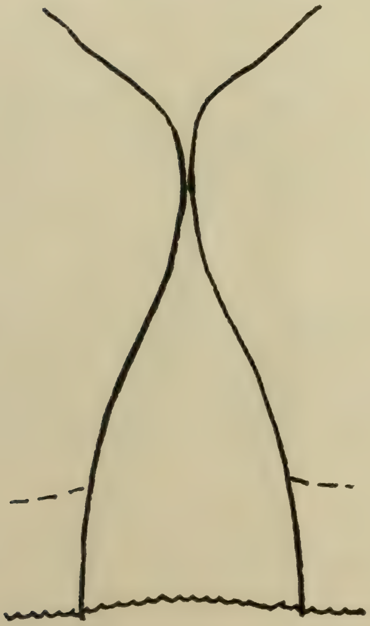
sufficiently loose in its socket to permit movement under pressure. If the gum septum cannot be protected from food lodgments, the best treatment is the extraction of the third molar.

FIG. 1.



Testing width of contact.

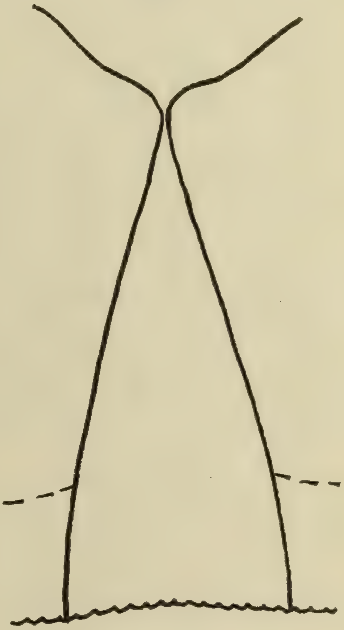
FIG. 2.



DESCRIPTION OF ILLUSTRATIONS.

FIG. 1. In *testing a contact* the ligature should be first carried through from occlusal to gingival, then the two ends of the ligature should be held parallel in the occlusal direction, as shown between the two bicuspids; the distance between the strands will indicate the bucco-lingual width of the contact. The two ends should then be held parallel in the buccal direction, as shown between the second bicuspid and first molar; the distance between the strands will indicate the occluso-gingival width of the contact. In either position, if the parallel strands are more than from 1½ to 2 mm. apart the contact is too broad.

FIG. 3.



FIGS. 2, 3, 4, AND 5. Good and bad forms of *proximal contacts,* buccal view. The proper position of the contact point for bicuspid and molar teeth is about as shown in Fig. 2, just a little to the gingival of the marginal ridges. The convexity of both surfaces at this point should generally change to a slight concavity in the gingival direction.

The position of the contact in Fig. 3 is too far occlusally. We cannot expect the gum septum to fill such a space, unless it would extend beyond its normal length. With such a form of contact, less than the normal portion of food will pass through the embrasures, and the exposed portions of the proximal surfaces

FIG. 4.

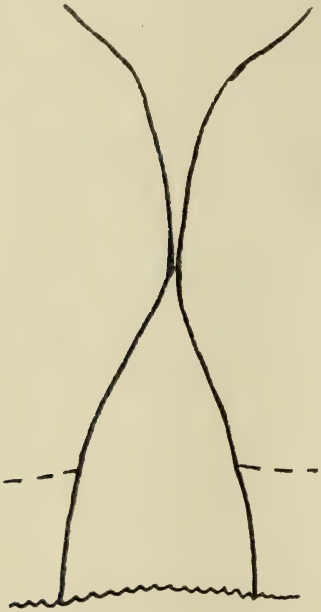


FIG. 5.

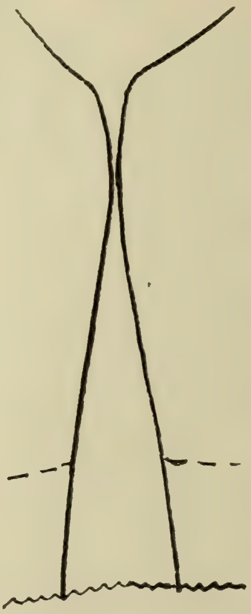


FIG. 6.

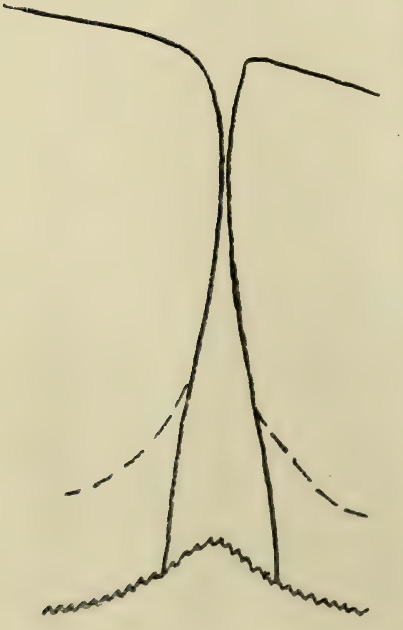
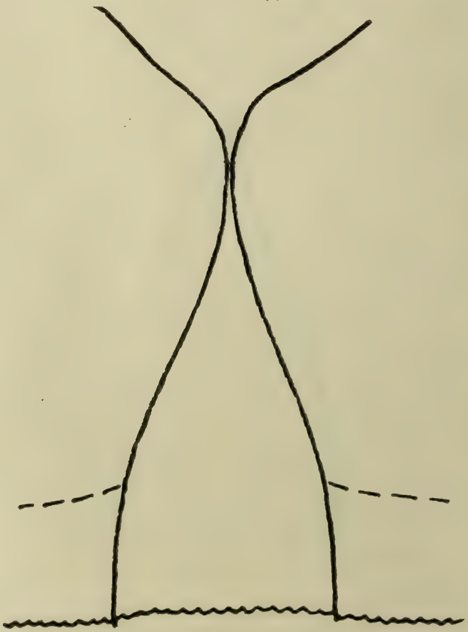


FIG. 7.



of the teeth will not be normally cleansed in mastication.

The position of the contact in Fig. 4 is too far gingivally. The long approaches from the occlusal invite the wedging of food between the teeth, with the danger of forcing the contact open.

The position of the contact in Fig. 5 is about right, but the teeth have not been separated to restore the normal mesio-distal width of the interproximal space. Compare the width of the alveolar septum with Fig. 2. There is in Fig. 5 only about half as much width of base mesio-distally to support the gum septum, consequently it will not be as healthy nor remain as high.

FIGS. 6 AND 7. Comparison of *anterior and posterior interproximal spaces*, labial and buccal view. Attention is called to the width of these spaces at the alveolar border in relation to the contact point. It will be noticed that the base is much wider mesio-distally between the bicuspids and molars than between the incisors. This would seem to give the more support to the septal tissue between the back teeth. It should be remembered, however, that the line of attachment of the gingivæ in the incisors is very convex, extending far toward the incisal on the proximal surfaces, thus compensating for the narrower alveolar base.

RECORDS.

I cannot too strongly urge the keeping of accurate records of the conditions referred to. I am convinced that it is worth while to make an entirely separate examination of the soft tissues, and to record the findings on cards or record sheets designed for this particular purpose. An operator cannot appreciate the number of these inflammations that are passing under his eyes every day until he makes it a matter of special observation and record.

There has been during recent years considerable criticism of the dental profession of America for its lack of progress as a scientific body. The recent criticism of Hunter and others cannot go unnoticed. While all that is said in most of these criticisms may not be true, there is a constantly growing belief that we are not making as much headway as we should. May I suggest that our best refutation of these charges will be the doing of scientific work, and the proving of this work with results obtained? In connection with the subject under discussion, I feel that no one thing will be of greater advantage than the collection by many operators of accurate records of the conditions that exist in the mouths of our patients. It is my firm conviction that the recognition of the relation of the apparently trivial inflammations of the gingivæ to the very serious destructions of the peridental membrane—which follow as does night the day—and an earnest endeavor to remedy and prevent these inflammations, by any dentist, will practically eliminate the occurrence of peridental disease among his patients. And as firmly I believe that the profession could almost stamp out pyorrhea alveolaris in a generation if the proper protection of the interproximal gum septum became general practice.

[See also *Discussion*, as reported under "Proceedings of Societies," this issue.]

THE NATURAL FIELD OF DENTISTRY.

By EDWARD H. BAKER, M.D., Chicago, Ill.

MOST dentists are rather chary of addressing patients about their bodily health, aside from mouth conditions.

The dentist is supposed to extend his inquiries only to the distal border of the third molar, and no farther. If tonsils and adenoids are sometimes observed or mentioned, it is supposed to be with a rather apologetic air.

However, the extension of scientific knowledge within the past few years is rendering increasingly clear the fact that the mouth, formerly supposed to play a minor part, is in reality one of the most important parts of the body, exercising a great influence on the tragedy of human life and death. At the end of this article I have appended the names of one hundred and twenty-five diseases the origins of which have been at times traced to mouth conditions. Following this, I have given a bibliography of authors who are authorities for the statements as to etiology.

THE DENTIST'S POSITION IN REGARD TO DIAGNOSIS OF ORAL SYMPTOMS OF DISEASE.

We find, then, that a very considerable proportion of the body infections, as well as chronic diseases, have been shown to originate in the mouth; that bad mouth conditions weaken the local resistance of the entire digestive tract, that they weaken general bodily resistance to infection, and that a large proportion of the chronic diseases take their origin, either directly or indirectly, from mouth conditions. We are getting some faint conception of the pathologic as well as physiologic parts played by food—of the great differences in results according to its kind, its quantity, and the manner of eating.

Why, then, should we say that the profession whose domain is the mouth has no right to advise in diseases of the regions influenced or governed by the mouth? As this includes every part of the body, it will be seen that the dentist, in confining his attention to mechanical lines only, without consideration of the bodily effects of those mechanics, is unwarrantably limiting his duties and circumscribing his usefulness.

Indeed, it is a question whether he is not in duty bound by his specialty to inform his patients of these facts, which he alone observes and appreciates. Is his conscience clear if he neglects to warn his patients of the gravity and far-reaching importance of mouth conditions? Is it not his duty to educate them as to the diagnostic importance of mouth indications, including appearance of the gums, pyorrhea, saliva analysis, etc.? For the dentist is in a position to recognize conditions of disease before they have as yet manifested any bodily symptoms.

Such patients, on being sent to their family physicians, will probably come back with a report that there is nothing whatever the matter with them; that they are perfectly sound and healthy in every way.

The dentist knows very well that congested, bleeding gums or constant pyorrhea do not indicate a condition of health but one of disease. And even with no changes made in the local mechanical causes, the same patient will show great fluctuations from time to time, according to the state of his general health, rest, fatigue, etc.* We are forced, therefore, to the inevitable conclusion that the dentist is in a position to recognize the presence of disease which is unsuspected by the physician, and is often denied by him. In the past, this has probably been the commonest cause of lack of sympathy between the dentist and the physician.

The two professions should co-operate closely. Whether the dentist has done his part I do not know, but it appears that in the past there has been only too little understanding and help on the part of the physician. The time has now arrived when, if the dentist will bestir himself, his profession should enter upon an era of unexampled high professional standing and great financial remuneration. This situation will occur just as soon as the public has been educated as to the importance of mouth conditions and their relation to the health of the rest of the body.

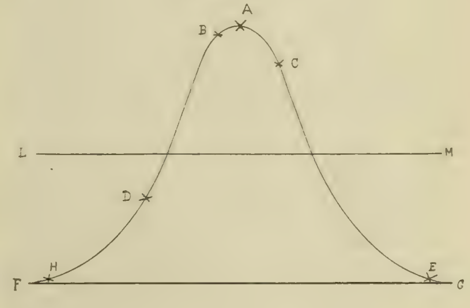
THE PHYSICIAN'S OPINION OF THE DENTIST, AND HIS OWN SHORTCOMINGS.

In the past, the importance of dentistry has often collided with the importance of the physician's self-pride; and so far, the physician's pride and supposed self-interest have stood firm, whereas the dentist's suggestions have rebounded, with little credit to him or his intelligence. It would scarcely seem fair to blame the physician for his attitude, when it arises from a natural situation for which he is not entirely responsible and which he does not understand.

The mouth is the dentist's field, and its indications are, for the most part, appreciated by him only. In certain noteworthy exceptions, physicians of broad gage and high ability have recognized the value of the dentist's findings. They have admitted that when the dentist found such abnormal mouth conditions, it must indicate some state of bodily disease; but they did not know what this was, and by the diagnostic methods at their command—which every physician realizes are more or less crude and unsatisfactory—they were unable to recognize or name the disease.

This failure of the physician to elicit definite responses to the few crude tests employed by him, and to give a definite name to the disease, has too often been the cause of the dentist's discomfiture. In other words, *the dentist suffered, not for his own inability, but for the physician's lack of knowledge.*

Fig. 1.



The health conditions of the body might with propriety be represented by the curve F A G (Fig. 1), which is practically a "Gaussian curve" or "normal curve of error."

Suppose that perfect health is indicated by the point A at the summit of the curve, a small variation or digression from healthful bodily activities would be indicated by B, near the top of the curve; another larger fault in the normal bodily metabolism might be indicated by a point C, farther down the slope; a serious disease—*e.g.* Bright's disease—might fall at point D on the curve, and death would be indicated by a point H or E at the bottom of the curve.

We will suppose that any chronic or acute variations from normal which are not "serious" enough to have attained to a definite, namable disease, with visible gross or minute changes in the anatomy of the principal vital organs, are indicated by points on the curve above the arbitrary line L M; but points on the curve which lie below the arbitrary line L M are accompanied by anatomical or physiological changes which are evident to the eye of the physician. Variations in health in the region above the arbitrary line L M are easily recognizable by the dentist, but are not ordinarily recognized or considered of much import by the physician.

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* In this paper I shall not take up the well-worn question as to whether pyorrhea is of local or systemic origin. For the sake of argument, it will be well to assume that it is entirely of local origin, and the statements contained herein are made from that standpoint.

The field of medicine, then, divides itself naturally into two parts. The upper, or head part, includes the field of minor as well as major variations; the lower part includes only major variations. The duties of the dentist bring him into daily contact with his field, whether he will or not. He has no choice in the matter; it is forced upon his attention by the nature of his profession.

The patient whose health is at the minor variation B or C does not go to the physician, because he feels that he is not "sick." And if he does go, the physician probably poohs at the matter, and tells him that there is nothing wrong with him, and he need not think any further about it.

It will be noticed that in this "smooth" curve, there are no abrupt changes or natural points of demarcation by which one can say that just at this point health ends and disease begins. On the contrary, any variation from perfect health will lead to serious disease and death, if allowed to progress. The line of demarcation, L M, is an arbitrary line, whose distance from the base line varies with the physician's ability to recognize disease.

THE RESPECTIVE FIELDS OF DENTISTRY AND MEDICINE.

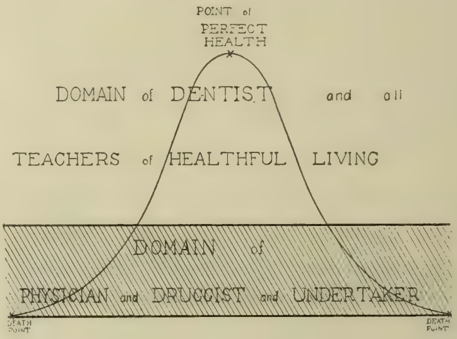
The respective fields of dentistry and medicine are shown in Fig. 2. It will be observed from the form of the curve that dentistry is not in the tail of the curve.

The mouth is probably, aside from the eye, the most sensitive index of bodily conditions which we have at our disposal. It is easily accessible, and its conditions are so evident as to be unmistakable. It offers the greatest opportunity for the diagnosis of disease conditions which have as yet shown no other recognizable bodily symptoms, and for which medicine has no tests.

At this point, the work of Dr. Michaels of Paris on saliva, or Dr. Kirk on saliva and bodily metabolism, and most recently that of Dr. Black, offer unmistakable evidence of the importance of the mouth as an index of body conditions.

My personal experience, after several months spent in saliva analysis in Dr. Kirk's laboratory, has shown me many cases in which ordinary methods of urinalysis, blood-examination, etc., gave no hint of the real trouble; yet these cases responded instantly to treatment along lines indicated by Dr. Kirk's findings.

FIG. 2.


POINT of PERFECT HEALTH
DOMAIN of DENTIST and all
TEACHERS of HEALTHFUL LIVING
DOMAIN of
PHYSICIAN and DRUGGIST and UNDERTAKER
DEATH POINT
DEATH POINT

The wonderful findings of Michaels in hundreds of different cases emphasize the seeming impossibility of explaining the diagnosis by saying that "He happened to hit the nail on the head." Analyses have been too numerous and results have been too uniform for that. And now come Dr. Black's preliminary announcements of discoveries regarding calcific deposits. While his results have not as yet been corroborated, yet he is a man with the record of a lifetime for making good, for going at problems in a careful, methodical way, and applying his wonderful common sense in a simple way to separate complex things into their component factors and show the truth.

For the last five thousand years men have been "treating" disease in two ways: First, they waited until the patient was very sick, until there was indubitable evidence that he was a very sick man; second, they treated him by empiric—experimental—methods, without knowing whether any certain remedy was suitable or not and not knowing whether or not it would do any good.

The day has now arrived when it is possible to see very early in the case whether the bodily metabolism is normal or not. It is no longer necessary to wait until the patient is ready to die with an incurable disease before finding out that he is sick. The dentist—not the physician—is the man who can sound this warning to the patient. He daily sees the mouths of patients who would not think of going to a doctor, because they are not sick.

DENTISTRY AS THE SCIENCE OF HEALTHFUL LIVING.

Thus dentistry is on the verge of becoming more important than it ever dreamed of being. Instead of being the tail-end of the medical profession, instead of being a mere tooth-carpenter, the dentist of today is at a point where he can, if he steers his craft properly, be at the head of the greatest profession the world has ever seen—the profession which teaches healthful living.

Out of the whole wide world, only in far-off China have the doctors adopted the ideal office of the physician, by being paid to keep the family well. If the family falls sick, he is to blame and his pay stops. But this is only a pretense, as his supposed curative powers were based upon magic, rather than upon common-sense methods of right living.

But today, the dentist already knows many of the basic principles of right living. He knows the absolute need of *exercise* for the teeth by eating hard food, which excites a flow of saliva, and which, if eaten from infancy, will insure freedom from green stain, from malocclusion, from caries. He is collecting statistics which may prove that the child of the rich, with his pampered body, cannot show the strength of tissue and the resisting power against bacterial invasion which are shown by some of the poorest children, simply because the poor child eats hard, simple food, and because he is freer from the evils of overfeeding.

With the physician, the question of mastication of food, of selection of food, of quantity of food, are not sufficiently considered. The dentist realizes their importance; he sees the results every day. The physician does not see them, and because he does not see these results by means of his physical eyes, but has to see with the "eye of faith," the question seems to him rather a visionary one—is somewhat of a far-away unreality.

Horace Fletcher told me that after he had written his first books he worked constantly for five or six years before he could make any headway with his ideas. Here was a man possessing all the advantages naturally accruing to a successful author, lecturer, and accomplished conversationist. He had *entrée* to the great newspapers, and was often interviewed and written up by them. Besides this, although retired from business, he was a shrewd and successful business man and one of wealth and refinement. Finally his son-in-law, Dr. Van Someren of Venice, read a paper on the subject before the British Medical Association. The great English physiologist, Sir Michael Foster, happened to hear this paper, and through his recognition of the value of the subject it finally reached the serious attention of the world. But up to that time, physicians never recognized its importance, and too many of them do not today appreciate the paramount importance of mouth conditions or of proper mastication of food.

It is the dentist who realizes the necessity of right living. It is a dentist who has announced that calcific deposits may be caused by the simple and universal process of overfeeding. Does anyone suppose that these deposits are confined alone to the teeth? Are the valves of the heart immune? Are the coats of the arteries unaffected? Yet suppose a dentist were to talk from now until doomsday, could he expect to get the family physician to co-operate with him in trying to check over-eating in a family, in trying to get them to avoid eating of candy and preserves and pastry, in inducing them to eat some zwieback and parched corn?

No, the dentist must depend upon himself. He must discover the first evidences of disease; must see that right methods of living are taught. These healthful methods must be taught in the public schools, in lectures, in leaflets, in newspapers, by visiting nurses, by the dentist himself. And if he succeeds in inducing the patient to live rightly, there will be comparatively few cases of serious disease left for the physician's domain. The physician will then be obliged to change his profession to that of a health teacher, or else with the priest and the undertaker be relegated to the consideration of the final passing away of the aged.

The sound advice, however, as to healthful living now being given in the public bulletins of municipal health departments furnish an unmistakable evidence that medicine is beginning to turn its attention to advice about healthful living. Hence, dentistry will probably not win all the laurels in these fields. For the sake of humanity, let us hope that the spread of knowledge about the importance of mouth conditions will soon lead all physicians to change an attitude of callous indifference to one of appreciation and help for the endeavors of the dentist.

In the meantime, instead of arguing whether dentistry is a part of medicine, or whether it is the tail-end of medicine, or whether it is a separate profession, it will prove more lucrative for the dentist to "saw wood" for a little while. There is a legend on the entrance door to the library of the University of Pennsylvania which reads "Talkers are no great doers."

A little quiet, concerted, unpretending *work* at the present time will place dentistry in a new and enviable situation. No struggles, no shouting, no scheming are needed.

THE MOUTH THE BEST INDEX OF HEALTH OR DISEASE.

The situation is already prepared. Here is the mouth, the most important part of the body; here are the facts of its tremendous influence upon the rest of the body. In the mouth appear the first indications of disease; in it are recorded instantly the effects of proper food requiring chewing. No need to analyze stomach contents or examine the feces with a microscope.

The healthful effects of exercise, fresh air, vacations, freedom from worry, etc., are all instantly recognizable in the mouth. Ordinary blood tests may show only a tardy alteration, and ordinary urinalysis may give no trace at all of the fact that, owing to changes in the habits of the patient, his health index has just reversed its direction. Whereas the progress was lately toward death, the bodily metabolism is now moving toward life and health. Ordinary medical tests are almost too clumsy to detect the slight difference between the two conditions. Why, then, should the dentist feel any delicacy about lack of medical knowledge? It is not high-sounding phrases or long words that count. It is ability to recognize conditions of disease as early as possible and prescribe a remedy. That remedy is healthful methods of living.

The mouth seems to offer an index exceedingly delicate of the reactions of the protoplasm of the body cells. This index is as delicate and sensitive as a delicately poised wind-vane.

In the mouth are registered the effects of mercury and other drugs, of periodical sprees, of over-eating, of vacations and outdoor life, of a thousand-and-one things which determine the life or death of the body. But no physician has tests by which he can determine such everyday occurrences as these. Only when wrong conditions have culminated in pronounced changes in the tissues or functions, and after examination of the gross or microscopic alterations, can the physician announce the presence of disease. And then, as to causes, they are a matter of guesswork and "case history." But not only can the dentist detect disease before it can be named and before it has progressed so far as to seriously involve the body organs, but he should trace the causes and prescribe a new way of living which shall cure.

Let no one despise or underestimate the offices of the kindly, wise, and broad-minded physician. But, on the other hand, let the dentist remember that in his chosen province, the mouth, are the indices and the keys to life and death.

Dentistry has chosen its own location in the body, and this location is not in the region of the caudal appendage. It is in the mouth, and in accordance with this location, dentistry will not be the tail-end, it will be the head-end—with a big mouth, powerful jaws, and large, strong, clean teeth! These teeth will enable it to grind thoroughly the grist which is put into the professional mill. And the grist will include not only beautiful prosthetic work, skilful operations, and careful prophylaxis, but daily preliminary diagnoses of incipient disease and advice about right living.

Before long this advice will be heeded as it is not heeded today, because the public will have been educated to the comprehension that the dentist knows what he is talking about.

DENTISTRY'S FUTURE.

Thus the dentist will come to be esteemed by the community not only for mechanical benefits but for sound advice on matters involving the life and death of the individual as well as of the nation.

We might say, then, that there will be two kinds of professions. One profession, at the head, will consider disease which has only commenced, when death is as yet a long way off, and when joy and hope are active. Here belong dentistry and the advisers of how to *live.* At the other end, where disease ends, are death, the pathologist, the prescriber of drugs, and the undertaker.

There is no question that the human mind naturally seeks the society of the cheerful, of those things associated with life and hope and health and youth. When dentistry has accomplished its wonderful stage of present-day evolution, the dentist will no longer be avoided as long as possible. He will be sought as one who brings health and comfort and freedom from pain. People will go to him not because they have toothache, but in order that they will not have toothache. The dentist's offices will become more and more preventive, and he will come to be welcomed as the most useful, popular, and highly rewarded member of society.

Diseases due to Mouth Conditions.

(The numbers refer to the Bibliography.)

Actinomycosis, 13
Adenitis, 36
Alopecia areata, 1, 38, 39, 51, 60, 67
Anemias, 13, 31, 36
Appendicitis, 36
Arms, paralysis of, 13
  tonic spasm of, 13
Arthritis, 13, 31
  rheumatoid, 21

Bright's disease, 36, 72
Bronchitis, 13, 22

Cardiac irregularity, 13
Catarrh, 72
  of stomach, 13
Cholecystitis (septic) a fatal disease, 12
Chorea, 13
Colds, 72
Colitis, 36
  mucous, 13
Complexion—dirty gray, 33
  pimples, 13
  sallow, 36, 72
  wax-like, 33
Constipation, 13
Convulsions of teething, 13
Cord, spinal, lesions of, 36

Deafness, 13, 55
Debility, 13
Deformities of weakness, 13
Diabetes, 72
Diarrhea, 13
Diphtheria, 13, 22, 49, 52
Dyspepsia, chronic, 13, 36
  flatulent, 13
  functional, 36
  nervous, 72

Ear—catarrh of middle, 13
  deafness, 13
Earache, 13
Embolism, 19
Endocarditis, infective, 13, 66
Enlarged cervical glands, 13, 30, 36, 53
Enteritis, 36
Epilepsy, 3, 13, 59

Erysipelas, 48
Eye—amaurosis (blindness), 13, 68
  amblyopia (impairment of visual acuity), 13
  asthenopia (weak eyes), 13
  blepharospasm, 13
  diplopia, 13
  glaucoma, 78
  inflammation, 24, 28
  lacrymation, 13
  muscular insufficiency, 13
  nystagmus, 13
  paresis of accommodation, 13, 40, 69
  paresis of levator palp. sup., 13
  spasm of accommodation, 13
  spasmodic contr. of int. rect. muscle, 13
  strabismus, paralytic, 13

Fevers, 36
Flatfoot, 13

Gastric catarrh, 13
  ulcer, 13, 36
Gastritis, 13, 36
  septic, 13
Gastro-intestinal disorders, 13
General debility, 13
  of children, 13
General infection, 7
Glossitis, 13
Gout, 79
Gynecological diseases, 13

Headache, 16
Heart disease, 16
  endocarditis, 13, 66
  irregular action of, 13

Hemiplegia, 19
Hysteria, 13

Ill-health, 36
Indigestion, 13
Infection, general, 7
Inflammations, 13, 22
Intestinal disorders, 36

Joints, septic infection of, 13

Kidney disease (see also nephritis and Bright's dis.), 36, 72

Liver, hypertrophic cirrhosis of (Hanot's dis.), 13
Lung diseases, 16, 54
Lymphadenitis, 13, 30, 36, 53

Malaise, 72
Malnutrition, 16, 47, 65
Mastoiditis, 7, 13
Mental depression, 36
Migraine, 16

Nephritis, 36, 72
Nervous disorders, 36, 72
Neurasthenia, 13
Neuritis, toxic, 13, 35
"Neurotics," 36

Otalgia, 13, 64

Pancreatitis, 13
Paralysis, 13, 19
Parotitis, 11, 13
Periostitis, 13, 22
Pernicious anemia, 6, 13, 36

Pneumonia, 13, 22
Ptosis (of eyelid), 13, 27, 42
Puerperal fever, 22, 45
Puerperal septicemia, 22, 45
Purpura, 36

Rheumatic affections, chronic, 13, 36, 79
Rheumatoid arthritis, 21

Sapremia, 13
Septic anemia, 13, 31
  fever, 36
Septicemia, 13, 36
Skin diseases, 72
Spasmodic closure of lower jaw, 13
Spinal cord, subacute combined degeneration of, 13
Stomatitis, 13
Strabismus, paralytic, 13

Throat disease, 5, 72, 74
  sore, 5, 72
Tonsillitis, 33, 72
  septic, 7, 13
Tonsils, enlarged, 36
  infected, 36
Toxemia, 13
Toxic neuritis, 13, 20, 35
Trismus, 13, 18
Tubercular glands, 13
Tuberculosis, 13, 16, 54

Ulcer of stomach, 13

Weight, loss of, in children, 13, 16
Wryneck, 27

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INSTRUMENTATION THE PRIME FACTOR IN TREATMENT OF CONDITIONS CAUSING DISTURBANCES OF THE ALVEOLO-DENTAL LIGAMENT; SYSTEMIC TREATMENT MOST ESSENTIAL IN ADVANCED CASES.

By **ARTHUR ZENTLER, D.D.S., New York City.**

(Read before the Bridgeport, Conn., Dental Society, June 16, 1911.)

NUMEROUS indeed are the essays that have appeared in dental literature dealing with the condition under consideration in this paper, and various are the names given by essayists to this condition. While it is of importance for a clear understanding that a suitable and definite name be adopted for any specified pathological condition, when the main object is its cure, its name after all is of secondary importance.

NOMENCLATURE.

I shall, nevertheless, without pretense of having solved the question of correctly naming this condition, suggest for it the name of "alveolo-dental arthritis," and for the purpose of convenience, shall classify it as "primary," "secondary," and "tertiary" alveolo-dental arthritis.

It is not my intention at this time to make any contribution regarding the etiology of this condition, but I would call attention to that part of Prof. G. V. Black's recent article, published in the *Items of Interest* for June 1911,* in which he points out that the gathering of "agglutinin" upon solid surfaces in the mouth is indispensable before deposits of calculus can be formed. As the title of my paper indicates, I believe, that this condition is due to the disturbance of the alveolo-dental ligament caused by irritation from foreign elements, local or systemic, as the case may be more or less advanced. More than enough has been said regarding the pathology of this condition, yet, since its etiology is not quite clear I shall, in the presence of such obscurity, deal mostly with its therapeutics. This may seem irrational, yet it is quite necessary until the correct etiology and pathology of the condition is established.

I shall defer until some later time my explanation of the name alveolo-dental arthritis, because this would imply dealing with the etiology and pathology of the condition. I shall, however, dwell upon the classification "primary," "secondary," and "tertiary," the object of this classification being to prove more convincingly the contention that instrumentation is of foremost importance, and that systemic treatment is essential in advanced cases.

PRIMARY ALVEOLO-DENTAL ARTHRITIS.

In this stage the condition is never noticed by the patient, unfortunately little considered by the profession, and therefore is very seldom remedied, resulting in its progression to the secondary and tertiary stages.

Diagnosis. Only very careful examination, such as ought never to be neglected in any patients presenting for dental inspection, will disclose the signs indicating the primary stage; of symptoms there are none.

The nozzle of the compressed-air syringe, placed upon the gum festoons surrounding the cervices of all the teeth, lingually, labially, buccally, and interstitially, is the only efficient and at the same time harmless means of diagnosing this condition in its primary stage. When the mouth is presumably kept in good condition and no deposits of calculus are to be seen on the free surfaces of the teeth, we may detect, by the above-described means, some traces of deposits underneath the gum festoons, although to the naked eye these may seem quite normal and give little external indication of the disease.

Therapeutics. Short as the description of the primary stage may be, its treatment is by no means a short operation; many hours and many sittings, according to the general condition of the patient, may be needed before every possible cause of a future irritation is removed. Thin shreds of cotton saturated in a mixture of a 4 per cent. solution of cocain and 1 per cent. adrenalin are carefully placed around the gum festoons of two or three approximating teeth, and gently pressed under the free margins of the gum. About five minutes or longer will be needed to obtain analgesia of the mucous membrane surrounding the cervices, and therefore it is wise to wait at least five minutes before removing the shreds of cotton from the first tooth and beginning to operate upon it. The other shreds can be left in place until the operator is ready for the next tooth. One by one, each tooth is treated until, with such instruments as in the hands of the individual operator have proved best for that purpose, even the least detectable deposit is removed. In the primary stage of the disease it is very important that no laceration of the gum tissue or of the pericemental membrane be occasioned. Such a laceration in the mouths of patients with low opsonic index may become a portal of infection, and thereby bring about just what the treatment was intended to prevent, *i.e.* the secondary stage of the disease.

It is therefore necessary that the selection of instruments be well made, and the movements for the removal of the deposits be judiciously studied before being put into practice. A mouth-wash of antiseptic and astringent qualities will be found beneficial in cases where laceration was not prevented; otherwise this should be dispensed with. After the operator is convinced beyond all reasonable doubt that all deposits are removed, the surfaces from which such deposits were removed must be carefully and thoroughly smoothed and polished with orange-wood points saturated with pumice and carried in a hand porte-polisher.

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* "Beginnings of Pyorrhea Alveolaris, Treatment for Prevention," *Items of Interest*, vol. xxxiii, p. 420.

The compressed-air syringe will be found a great help during the entire operation. It will keep the surface operated upon under better observation, and will efficiently eliminate the detached particles.

Instructions as to careful home prophylaxis and as to the need of often repeated examinations will complete the treatment.

The prognosis is always favorable, if treatment and instructions are carried out carefully.

SECONDARY ALVEOLO-DENTAL ARTHRITIS.

If the primary stage has been neglected, or if through careless instrumentation or injudicious operative or prosthetic measures, irritation of the pericemental membrane is occasioned, the second stage is invariably invited.

This stage is recognized more readily than the primary one, but nevertheless it is often ignored by the patient as well as the operator.

Diagnosis. Deposits upon the free surfaces of the teeth, redness of the gum festoons, slight recession of the gums, and pockets around the roots of the teeth most seriously affected by the causes of the irritation, indicate, at first sight, the secondary stage. A more minute examination will disclose the extension of these deposits over some of the roots, especially in the teeth where pockets are found. Upon pressure we may and may not find a slight exudate from underneath the inflamed festoons; often this is simply a mixture of blood and mucus, and sometimes pus.

Pressure upon the gums in this stage will seldom produce pain, but this symptom will often be found during brisk climatic changes, and usually it will be difficult for the patient to determine the exact location of pain.

Therapeutics. In this stage of the disease, as in the former, thorough instrumentation must be chiefly relied upon, and while undue laceration is to be avoided, it will be found that in areas of hypertrophied or atrophied gum tissue, after the deposits have been thoroughly removed the laceration will act as a cell stimulant, and the chemotactic process will go on more readily—the loosened gum festoons will sooner and more tightly embrace, as it were, the cervices of the teeth than if laceration is avoided. In this, as in the primary stage, the application of an analgesic previous to operating is needed, and after each individual tooth and root, as far as it can be reached without disturbing the pericemental membrane, has been thoroughly rid of deposits, and smoothed and polished with orange-wood points, the affected parts are painted with tincture of iodin, a mouth-wash is prescribed if the laceration was extensive, and instruction as to home prophylaxis is given. The need of often-repeated examinations is also impressed upon the patient, thus completing the treatment.

Prognosis. If the treatment has been carried out conscientiously and the instructions given are carefully heeded by the patient, the prognosis may be said always to be good, provided that all operative and prosthetic work that has been done in the mouth of the patient previous to our treatment is so corrected —if need be—that as nearly normal occlusion as possible is re-established; for without normal occlusion, the alveolodental disturbances are sure to recur, in spite of all the efforts combined of practitioner and patient.

TERTIARY ALVEOLO-DENTAL ARTHRITIS.

This is the stage in which the patient presents himself to us with the knowledge that "something is wrong with his gums," and it is in this stage that most practitioners begin to treat a disease which has entered, it may be said, a chronic state, difficult to control both because of the difficulties encountered in coping with the condition, and because of the reluctance of most patients to submit to the now very tedious treatment.

Diagnosis. The signs and symptoms of the tertiary stage are very easily recognized, and at times very well sensed by the patient. The gums around the affected parts are tumefied, of a reddish color, varying from a bright red to a deep purple; more or less exudate is always present at the free margins of the gum, sometimes being only of a mucous character, at other times of a bloody and even purulent consistence. The festoons of the gums are more or less detached from the cervices of the teeth, and in most instances this condition is accompanied by such pronounced recession of the gums that large root portions are exposed. The teeth so affected lack their natural firmness in their alveoli, which are greatly resorbed; in advanced cases they seem barely to hang on by a thread.

The tenderness of the gums around the affected areas is quite marked, and the teeth, loose though devoid of caries, are quite painful during mastication, or whenever they are roughly touched. This symptom is of course the more marked the looser the teeth are. In many instances, rapid changes of temperature are readily and often painfully felt.

Cases in which, besides marked recession of the gums, there is extended detachment of the membrane uniting the roots of the teeth to their alveoli, which are largely resorbed, illustrate the more advanced stages.

Therapeutics. At once I must emphasize that in all cases presenting this stage of the disease the first attempt at bringing about a cure must consist in ascertaining whether some of the affected teeth have not gone beyond the point of possible conservation, and, when this conclusion is reached, they must be sacrificed without hesitation, for the good of other organs. Most thorough and effective instrumentation for the purpose of removing every detectable particle of calculus, and the obtaining of absolutely smooth surfaces of all the parts of the teeth and roots which are denuded of soft tissues which normally cover them, are to be resorted to after analgesia of the affected areas has been produced.

To obtain these results, such measures as have been described in connection with the treatment of the earlier stages of the disease will have to be carried out most scrupulously, and when the operator feels that he has done all that he possibly could do in this direction, his attention must be directed to re-establishing proper contact points when these have been lost through the effects of the disease, and to bringing about as nearly normal occlusion as possible.

Systemic treatment. While in the primary and secondary stage of alveolo-dental arthritis the treatment is considered finished when instrumentation has been effected, local counter-irritants have been applied, and cleanliness has been advised in order to avoid the accumulation of new deposits, in this the tertiary stage the operator finds himself face to face with a condition as to which—until the true etiology of this disease shall have been established—we do not know whether it be the cause or the result, or maybe both cause and result, of a disturbed metabolism. The faulty metabolism present in arthritics is found in all patients presenting in their mouths the symptoms of the tertiary stage of alveolo-dental arthritis; therefore, after the local irritants have been removed by instrumentation and normal contour and occlusion have been re-established, the constitutional irritant, *i.e.* the faulty metabolism, must be removed by applying such medicinal and other curative agents as are applied in all arthritic cases.

Prognosis. If no effort is made to retain such teeth as are beyond saving, and if, after thorough instrumentation, local conditions are brought as nearly to normal as possible, the complete cure of the disease will depend upon the greater or lesser possibility of re-establishing proper metabolism.

CORRESPONDENCE.

FROM THE NATIONAL DENTAL ASSOCIATION COMMITTEE ON PATENT LEGISLATION.

TO THE EDITOR OF THE DENTAL COSMOS:

Open Letter to the Officers and Members of State and Local Dental Societies of the United States.

WASHINGTON, D. C., April 1912.

A HEARING has been had before the House Committee on Patents in respect to the merits of the proposed legislation pending before that committee upon H. R. 20,591—"Amending the statutes relating to patents, relieving medical and dental practitioners from unjust burdens imposed by patentees holding patents covering methods and devices for treating human diseases, ailments, and disabilities," etc.

This bill was introduced at the request of the Committee on Patent Legislation of the National Dental Association, and its consideration and passage depend upon the support given it by the state and local dental associations throughout the United States. The coming meetings of these bodies afford the means of keeping up a constant agitation before Congress, if their officers and members unite in passing and forwarding petitions and resolutions indorsing the bill to the members of the Committee on Patents of the House of Representatives. It is to be hoped this will be done at once, and that it will end in the passage by the Congress of the legislation proposed by your committee.

The following gentlemen constitute the membership of the Committee on Patents of the House of Representatives:

WM. A. OLDFIELD of Arkansas, *Chairman.*
MARTIN A. MORRISON of Indiana.
EDWIN Y. WEBB of North Carolina.
FRANK CLARK of Florida.
JOSHUA W. ALEXANDER of Missouri.
R. J. BULKELEY of Ohio.
MARTIN W. LITTLETON of New York.
OSCAR CALLAWAY of Texas.
SAMUEL A. WITHERSPOON of Mississippi.
FRANK D. CURRIER of New Hampshire.
E. STEVENS HENRY of Connecticut.
WM. W. WILSON of Illinois.
IRVING L. LENROOT of Wisconsin.
WM. H. WILDER of Massachusetts.

The dental profession is confronted by a situation similar to the litigation of the "Goodyear Rubber Plate" and the "International Tooth-Crown Co." upon process patents—owing to the lack of support to this same legislation some ten years ago by the profession. The "Taggart *vs.* Boynton" litigation is now confronting you, and while this bill cannot affect that litigation one way or another, it will serve to bar any such litigation for the future. We thought we were safe after the "Goodyear Co." were stopped from claiming tribute from the profession. Then came the "International Tooth-Crown Co.," and we were again forced to battle in the courts of the land. That was stopped by the Dental Protective Association's efforts, and we again felt that our profession was safe from future efforts of this kind. And now comes the "Taggart *vs.* Boynton" litigation, to prove our assumed safety to be wrong again. Let us now, by united effort, prevail upon Congress to so legislate as to preclude further embarrassment of this nature to the members of the dental profession. Congress will take no action if the profession and its representatives do not, by their actions, show that they desire it. The proposition is now "up to" the dental associations. "Ask, and it shall be given you."

Societies receiving favorable answers regarding the passage of the bill will please communicate the same to this committee:

EMORY A. BRYANT, *Chairman,*
Washington, D. C.
CHAS. R. E. KOCH, *Sec'y,*
87 Lake st., Chicago, Ill.
C. N. JOHNSON,
Chicago, Ill.
Committee on Patent Legislation, N.D.A.

PROCEEDINGS OF SOCIETIES.

SEVENTH AND EIGHTH DISTRICT DENTAL SOCIETIES OF THE STATE OF NEW YORK.

Forty-third Annual Union Convention.

(Continued from page 591.)

THURSDAY—*Evening Session.*

THE meeting was called to order by Dr. Luther, president of the Eighth District Society, at 8 P.M. Thursday, November 9th.

The President announced as the first order of business the reading of a paper by Dr. A. D. BLACK, Chicago, Ill., entitled "The Beginnings of Diseases of the Peridental Membrane, and Their Prevention."

[This paper is printed in full at page 684 of the present issue of the COSMOS.]

Discussion.

Dr. D. H. SQUIRE, Buffalo, N. Y. There is no question that Dr. Black's observations are all too true, and his mild criticism of our negligence in the recognition and treatment of inflammation of the tissues within the interproximal space is fully justified. Indeed, if his criticism were proportionate to our apathy, it could in many cases be made much more drastic. A paper made up of personal observations is very difficult to discuss, as facts are not debatable. It is indisputable, however, that the general practitioner often finds it impossible to spend time in treating many of the conditions which he does recognize to be injurious. This procrastination on his part seems to be warranted because it would be impossible for him to obtain a fee equal to that which he receives for the more elaborate operations in gold, or because his patients do not appreciate the services described by the essayist. This attitude is, of course, a delusion, because a dentist practicing oral prophylaxis as a specialty receives almost twice as much per hour as the *general* practitioner can command for his most valuable operations. Some patients will appreciate the results of prophylactic treatment and recommend it to others. Many times we are our own stumbling-block in regard to the treatment of the beginnings of disease about the teeth. It is our duty to educate our patients in regard to the importance of these conditions, their direct bearing upon the usefulness of the teeth, and the benefits to be derived from a healthy oral cavity, instead of sitting back and prejudging their willingness to have such work done. It is time, indeed, that dentists in general followed the teachings contained in this paper, and appreciated their value.

The preventive treatment advocated holds more interest and encouragement for the dentist than any palliative treatment.

The title of the paper once more magnifies the importance of the preservation of the deciduous teeth, if for no other reason than the guidance of the first permanent molars into their proper positions, and their subsequent retention. These keys to occlusion control the positions which the other permanent teeth shall occupy in the dental arch after their eruption.

Angle says: "The sizes, forms, interdigitating surfaces and positions of the teeth in the arches are such as to give to one another, singly and collectively, the greatest possible support in all directions." We can draw only one conclusion from this theory, which has been proved by clinical observation, namely, that occlusion is the basis upon which the future health of the tissues of the interproximal space depends. Disease may arise, but a well-balanced occlusion is the best insurance against it.

The preventive and operative treatment of the teeth will not be of lasting value without normal occlusion. In working toward the future welfare of our young patients we must ascertain, first, whether the teeth are in proper occlusion, and if they are not, the patient should be placed in the hands of an orthodontist for treatment. Then, when in normal or corrected occlusion, the teeth may be kept by the dentist in proper alignment by prophylactic and operative measures. The prophylactic treatment should be given monthly and be thorough, while the operative treatment should comprise the complete restoration of the surfaces of the teeth.

The so-called plus and minus contact points must be regulated by the amount of stress to which the teeth are subjected, as the peridental membrane will degenerate as readily under too much stress as under too little. In cases where the correction of malocclusion has been attempted by extracting, the situation becomes rather hopeless, as the teeth are so far separated from one another that while the septal tissues may not be intensely inflamed, yet their attachment to the tooth is broken, resulting in the formation of a deep pocket filled with calculus. If permanent results are to be obtained in these cases, normal occlusion must be re-established if possible, and the missing teeth supplied by artificial means.

Much may be accomplished by bracing loosened teeth with suitable splints anchored in the root-canals. By this method the teeth receive lateral support, still keeping them in contact with each other.

The carving and casting of the morsal surfaces of molar and bicuspid crowns will do much toward maintaining a perfect occlusion.

The slow separation of teeth is another source of injury to the gum tissue. In the use of the materials employed for this purpose, precautions against crushing the gum out of the interproximal space are often neglected. A metallic support should be placed horizontally to the gingival wall, so that when the force of the bite is exerted upon it, the separating material will spread laterally, thus forcing the teeth apart by pressure brought to bear upon their approximal surfaces, instead of the gum tissue. In incisors and canines the cotton, silk, or tape employed should be tied with a ligature between the points of contact or against the approximal surfaces.

In the operative treatment of patients past thirty years of age, it has been my practice to obtain plaster models upon which I map out the procedure to be followed. During the past two years, a tabulated record of the more extensive inflammations noted about the teeth has been kept, and the results of both operative and preventive treatments are very satisfying to my associate and myself. The patients are instructed in the care of their teeth, and soon feel the need of regular prophylactic treatment.

In many mouths malocclusion is not due to extraction or loss of contour, and in such cases diseases of the peridental membrane are found, both in the incipient and advanced stages. Nevertheless, should not malocclusion be added to the exciting causes of inflammation of the tissues about the teeth which Dr. Black has mentioned, since the impact of the force of mastication is delivered at an improper angle upon occlusal surfaces of all malposed teeth? In my opinion this condition in itself produces sufficient irritation to be a prolific contributing factor, if not the exciting cause, of the degeneration of the peridental tissues.

Dr. B. S. HERT, Rochester. In the last portion of his paper, Dr. Black mentions the criticisms to which the dental profession of America has been subjected for not making progress along scientific lines; yet such a paper as he has just presented, and many other essays treating more or less on the same subject that have frequently appeared in our dental journals, especially the paper mentioned that was read before the Second District Society of New York by Dr. G. V. Black, would seem to refute effectually the charges of such critics. The essayist, however, seems to share that critical feeling to some extent, and suggests that a good method of disproving such criticisms would be to keep accurate records of the conditions noted, and their treatment, and the results obtained. I cannot agree with him in approving the critics, but must most emphatically commend his suggestions; for, while we have been making excellent progress in the past, we must, and in my opinion shall, in the future surpass it.

Not many years ago many teeth were lost through caries, dentistry not being far enough advanced to save them. As operative procedures have been perfected, any tooth, no matter how badly decayed, can be made as useful as it ever was, if a reasonable amount of the root remains and is or can be made healthy. Having progressed thus far, we were confronted with the problem of retaining the most important part of the tooth, the root, in its proper place, and treating the diseases to which it and adjacent tissues were subject. For a number of years a continually greater attention has been devoted by dental literature and dental conventions to this subject; practicing dentists and investigators have devoted more time to research in the prevention, treatment, and cure of peridental disease, with the result that many teeth, the supporting tissues of which are diseased when they first come under observation, are now treated and saved. While this treatment is still largely empirical, we are advancing, and though we do not yet thoroughly understand the etiology of these diseases, we are able in very many cases either to prevent or cure them.

Medicine in all its branches is moving toward the much-desired goal of prevention, and the essayist's message regarding our efforts toward the prevention of the diseased conditions which cause the loss of the tissue that retains the tooth in place is most timely. That such prevention is possible no one who has given reasonable attention to this subject in his own practice can question.

The three etiological factors mentioned by the essayist as producing diseases of the peridental membrane can, by careful examination, be detected and corrected before serious injury has been done to this tissue. Success in this treatment, however, as in all branches of dentistry, requires painstaking care, a positive conviction on our part as to the benefits we are conferring on the patient, to whom we must impart also the belief that preventing is better than curing. That local causes are very important, if not the sole etiological factors, in pyorrhea alveolaris no one can deny, and the causes mentioned by the essayist are the most important of them. The first, salivary calculus, can be quite easily observed and removed. With serumal calculus the case is quite different, since often deposits are present just under the gingival border which cannot be detected from the appearance of the gums, no deep red or bluish discoloration being present. Only by passing a fine scaler under the gum margin can the presence of serumal calculus be determined. Such deposits should always be removed, as their continued presence will eventually produce harmful results.

Injuries to the interproximal gum septum are by far the most frequent of the causes of peridental inflammation. These injuries are chiefly due either to lack of contact points or to improper contact points, and we should be more than ever impressed with the importance of properly filling the approximal surfaces of teeth. Dr. Black has not only called our attention to the beginnings of peridental inflammations, but has suggested methods of remedying them, and indicated the measures necessary for preventing their recurrence. In addition to the preventive measures mentioned by him, I wish to emphasize the regular prophylactic treatment of the teeth. This, I believe, has been quite extensively adopted by the profession as a means of preventing oral diseases, with the very gratifying result that diseases of the gums and peridental membrane are being prevented to a very marked degree.

In closing, I want to stress the importance, in making examinations of the teeth, of paying at least as much attention to the condition of the gingival margins as to the teeth themselves. While I am not as optimistic as Dr. Black in the belief that pyorrhea could be stamped out by the dental profession in one generation, I do believe that a practitioner will have but very few pyorrhea cases if he properly looks after the mouths of those people who entrust themselves to his care.

Dr. F. W. Low, Buffalo. I was sixty-one years old the other day, and I do not expect to live long enough to see the generation which will no longer be afflicted with pyorrhea. I believe, however, that such a time will come eventually, and Dr. Black has given us the best start toward that goal.

Dr. N. S. Hoff, Ann Arbor, Mich. The essayist has pointed out to us in a most able manner the beginnings of more serious diseases, which we should treat more successfully if the original pathological tendencies were better understood. We all know how difficult it is to treat peridental diseases when they have engaged not only the peridental soft tissues to a large extent, but the bone as well. A great deal of technical skill and an infinite amount of patience are required in treating some of these conditions to secure degree of success. So far our remedial efforts have not met with enough success to warrant us in putting any great dependence upon them. If we undertake to treat these diseases at all, I think Dr. Black has given us the cue to be more careful in diagnosing and determining the causative factors in the early stages, and to correct the conditions which invariably lead to results that render a cure more difficult.

I would heartily indorse Dr. Black's statements, although probably I should not have the patience to undertake a tabulation in the manner suggested by him, as I have never been a good mathematician. Anyone, however, who is disposed to undertake such a tabulation will undoubtedly, as Dr. Black has said, find it not only a valuable means of recording these matters, but also of making him more careful in his inspection, because he would note symptoms worth tabulating, and would perhaps be a little more cautious. Such careful work ought to give us a little more inspiration toward making use of the statistics gathered in this way for a more careful study of the problem involved. The etiology of these peridental troubles is not clear, as you all well know, and it is this phase of the problem that we must solve before we shall be able to treat them successfully. If by such methods of investigation we can eventually determine that these diseases are caused by purely local conditions, such as Dr. Black has so clearly pointed out, *i.e.* defective fillings, malocclusion of the teeth, and others, and that there are no systemic causes underlying them, then, in my opinion, it would be very much to our discredit if we were not able to circumvent or conquer them in a short time. I have a suspicion, however, that some of these conditions are the result of systemic conditions, and that diseases of the peridental structures are oftentimes not merely due to local causes of the sort mentioned tonight. Still, I do not wish to put any damper on the enthusiasm which Dr. Black has engendered here, since he has presented to us a study worthy of our consideration, and a line of work that we all can pursue. We do not need to be scientists to undertake such observations, which are largely a matter of recording what we encounter in our daily practice. This will induce us to strive not only toward applying corrective measures as a matter of routine, but toward critically studying all the conditions noted, and deciding whether they are merely incidents or whether they have a systemic cause underlying them. Such practice, of itself, has as much the character of scientific research as observations made in the laboratory and studied by more complex scientific methods.

Dr. J. O. McCall, Buffalo. I want to emphasize more strongly the point Dr. Squire spoke of, namely, the relation of malocclusion other than that connected with contact points, in its bearing on the inception of peridental disorders. I am sure, from personal observation, that the irritation or inflammation found around so many gold-banded crowns is due no more to the poorly fitting bands than to the poorly constructed occlusal surfaces. I have observed a great many mouths infected with pyorrhea, in which the gold crowns present have edges that are readily caught by the explorer; yet there is no apparent inflammation of the gum tissue around these crowns, nor any deposition of calculus under the gum margin. The teeth are apparently perfectly healthy, and yet, according to what we have been told tonight and according to our observation in other cases, we should expect to find these tissues highly inflamed. It is my belief that the direction in which the force of mastication is applied to these teeth, the interlocking of their cusps with those of opposing teeth, has a great deal to do with the health of the peridental membrane of these teeth. This observation is borne out by other cases in which all the teeth are in perfect contact, yet their malocclusion is evidently a direct cause of pyorrhea. I have here the models of a case of anterior open-bite occlusion in which the teeth are all in contact, and in which there can be no possible impaction of food in the interproximal spaces, and yet both upper centrals and one lateral incisor are becoming loose. The lateral presents a deep pyorrhea pocket and more or less extensive deposits all around, with inflammation of the gum tissue, due not only to the constriction of the arch and the crowding of the teeth, but also to the lack of proper use of the affected teeth.

Another point I wish to speak of is the use of the tooth-brush. I believe, if the teeth are properly scaled and polished, that any patient if properly instructed can use a stiff tooth-brush without causing inflammation of the gum tissue. I have always given patients stiff tooth-brushes, and have never observed recession of the gums except in cases of evident misuse of the brush. I believe that rather than giving our patients a soft tooth-brush we should teach them how to use a brush properly. Malocclusion, however, is the point on which I wish to lay stress, because I have come to attribute great importance to it in my own practice.

Dr. R. H. Hofheinz, Rochester. It is difficult to discuss this paper, because there is so little that one can disagree with. Dr. Black mentioned in the beginning that he did not intend to go into the systemic causes of pyorrhea. He has only incidentally spoken of malarticulation. There are three distinct factors in his essay, namely, salivary calculus, lack of contact point, and greater scientific tabulation.

In listening to his paper it seemed to me as if he had come here to assist us in accumulating salivary calculus. He tells us that the less we eat, the less calculus will accumulate in the mouth. He has entertained us for over an hour, and has given us as much food as we can possibly digest. We will possibly have to take a saline cathartic to get rid of some of it by tomorrow morning. I think the most interesting point in connection with salivary calculus, which was not original with him but with his father, is that the patient himself can remove any ordinary deposit, if he does it within twelve hours. It is therefore very essential for us to advise our patients not to brush their teeth in the morning at seven and possibly again at 12 at night, because by that time practically seventeen hours have elapsed, and the patient will not be able to remove the first deposit of salivary calculus. There is now a scientific reason why these deposits should be removed as quickly as possible.

The question of contact point I do not think I have ever heard argued so well, not even during the many heated discussions to which I have listened during the days of extension for prevention—possibly because Dr. Black has not as many friends to assist him in the argument. I do believe myself that, in a great many instances, too much scaling is done at the incipience of pyorrhea alveolaris. In many instances the proper restoration of the contact point is sufficient for all incipient conditions of pyorrhea. Of course it requires very careful examination to ascertain whether the contact point is in the right place. The essayist spoke of cases in which the third molar, even after its point of contact with the second molar had been restored, moved from its place owing to partial looseness. In those cases he advocates extraction of the third molar. Personally, I should be governed by the use or non-use of the third molar, and, if there is an opposing molar present, I should hesitate to extract it. I would make a compromise by cutting cavities in the second and third molars and cement an iridio-platinum bar in them. If in the course of time the interproximal space can be restored to proper health, an inlay connecting the two teeth will not only preserve the third molar for a long time, but will also restore its usefulness. This procedure has been applied in my own mouth, and the tooth is still under observation. This is one of the few suggestion I have to make in connection with the essayist's paper.

The tabulation records which seemed so difficult to Dr. Hoff, who as he says is not a mathematician—which dentists seldom are—are not at all complicated when you examine this method. It seemed to me rather difficult when Dr. Black spoke of it, but when I saw the diagrams on the screen and had the card in my hand, it appeared an easy matter to tabulate these cases and do it quickly. I think by these records we can come to conclusions which otherwise we would never be able to reach.

The statement that the European dentists have accused us of not being as scientific at present as we should be is true to a degree. It would be less true if the profession had more Black seniors and Black juniors.

Dr. WAUGH. The tabulation of cases was most interesting to me, aside from the ingeniously devised means of collecting the deposits for examination under the microscope. I want to ask Dr. Black whether we could not train our assistant, while we are examining the mouth, to make mention of the teeth and surfaces on these charts, and record the conditions observed.

Dr. BLACK. My assistant does that regularly.

Dr. WAUGH. The keeping of these records, then, is a very simple matter indeed.

Dr. WILBUR, Corning. Dr. Black spoke of the contact point, and on the screen showed the picture of a case where the interstitial tissue had grown very high between the canine and bicuspid, and he suggested that perhaps a filling should be inserted. Could not that condition be remedied by rinsing out the interdental space with the saline solution as suggested, and instructing the patient in the proper use of the tooth-brush?

Dr. WAUGH. I would like to ask Dr. Black whether he keeps a millimeter measure of the depth of the pockets, and a record thereof.

Dr. A. E. SAGER, Rochester. I was very glad indeed to hear Dr. Black mention Fletcherism in this connection. We have been trying to eliminate the evil effects of over-eating by saline purgatives, instead of coping with them the other way. In my opinion, ninety-nine out of a hundred of our patients are bolters, and we can see the evil effects thereof in almost all these cases. The cause of their trouble is faulty metabolism. If peradventure the average patient happens to perspire a little in walking, or in running after a street-car, he acts as if something serious had happened, while as a matter of fact he should be thankful for such exercise. Elimination takes place by way of perspiration as well as by way of the kidneys. So many people are too lazy to exercise, but they will sit down and gorge themselves, and the effects are shown in their mouths more quickly than in any other part of the body. Fletcher is on the right track; the mouth is the index of the whole digestive system, and I am glad that Dr. Black has emphasized that point.

Dr. HOFHEINZ. I would like to know whether Dr. Black or his father has been able to demonstrate which foods, nitrogeneous or carbohydrate, are directly instrumental in bringing about deposits of tartar.

Dr. WILBUR. I would like to ask one question based on my own experience. For about four years I have been practicing Fletcherism. I am a rather small eater, and careful and thorough in masticating my food. I have read everything I could find on Fletcherism, and I have tried to practice the system. I am also thorough in the care of my teeth, using dental floss and the tooth-brush after every meal in the most approved fashion, but I cannot keep the deposits from my teeth. I wonder if the men experimented on by Dr. Black were in every case able to keep their teeth free from calculus, and I should like to know how it was done.

Dr. BLACK (closing the discussion). In answer to Dr. Wilbur's first question, I would say that there are cases in which a temporary inflammation has resulted in laxity of the fibers of the peridental membrane which hold or should hold the teeth in close contact. If the cause of the irritation is removed, these tissues may again hold the teeth tightly together. I would not have you gain the idea from my remarks that I should immediately rush into the operation of cutting a cavity and building out the contact in every case in which a contact is not as tight as it should be, or in cases in which there is a slight impaction of food between healthy teeth. I suggested a number of other measures which may be tried to restore the proper contact without making an extensive operation, and of course these measures should be considered previous to a filling operation.

Dr. Wilbur asked regarding the deposit of salivary calculus in his own case. I do not wish to contend that the matter of eating has sole control of the deposition of salivary calculus; I have no doubt that there are systemic conditions which influence this deposition, and if so, there must be individuals who cannot control that deposition by limiting their diet.

Dr. Hofheinz asked as to the influences of nitrogeneous and carbohydrate foods in producing salivary calculus. In the investigations made no special difference was noted in the character of the foods eaten, rather in their quantity.

Many suggestions have been made as to the causes of these inflammations of the gingivæ. I have mentioned those which I believe to be the most frequent. A good deal of stress was laid by Dr. Sager and Dr. McCall on the matter of occlusion in relation to these conditions, and I agree with them. I have not, however, found many dentures in abnormal occlusion, which did not also present abnormal contacts. There are certainly many abnormal contacts in the model which Dr. McCall presented. In cases in which teeth are elongated owing to the extraction of opposing teeth, one of the most distressing disarrangements of the contacts is noted.

I am glad that Dr. Squire mentioned the use of gutta-percha and other materials for slow separation, and called attention to the injuries which occur as a result of carelessness in their application. In that connection I would suggest the use of a proper mechanical separator, such as the Perry separator, as the best method of separating teeth for most operations. In more than ninety-five per cent. of approximal fillings I use this separator to gain the necessary separation, and place and finish the filling at the same sitting, without injury to soft tissues or causing soreness of the tooth. When we learn to make proper use of mechanical separators, which may be applied without injury to the soft tissues, I believe we will have fewer of the inflammations of which I have spoken.

Referring to Dr. Hoff's self-avowed lack of mathematical ability, I wish to add another word about the keeping of records. If we refer to books on the practice of medicine, we will find that almost every statement, almost every deduction, is made on the basis of accurate case histories. There is no one thing that has done so much to put the practice of medicine on a truly scientific basis as the keeping of accurate records in the form of case histories. Take, for example, the chapter on typhoid fever in Osler's work. The whole discussion of the subject is based on the records of numerous case histories, and the final summing up comprises thousands of case histories, from which the writer makes his deductions as to the symptoms presented and the treatment to be instituted. We shall not really understand conditions thoroughly and treat them rationally until we have a large number of practitioners keeping better records than we have today. I wish to make a special plea for the keeping of better records, not only of conditions of the peridental membrane but of all conditions which come under observation. If we would keep careful records, even if we never looked at them again, our power of observation would be sharpened to such an extent that we should see many things in our patients' mouths which we never observed before. If you wish to convince yourself on this point, take any object, examine it carefully, then set it aside, and try to write a description of it. You will not get very far before you will want to take another look at the object in order to clear up in your mind some phase that you had not observed with sufficient care. As a procedure for sharpening our keenness of observation, there is nothing else that will compare with the keeping of accurate records.

I would like to add a word as to the management of these cases. It has been said that some practitioners do not treat them because such treatment requires time, and possibly they would not be properly paid for their efforts. That is a matter which lies entirely with the individual. If I find a filling which is not in proper contact with the approximal tooth, it depends on the patient whether or not I tell him what I am going to do. Only a few days ago I examined a mouth in which I found two fillings which did not make contact with the approximal teeth, and in both cases the gum was being injured. I did not tell the patient that I intended to cut cavities in fillings that had been previously placed by someone else, and build out proper contacts. I simply said that there were two places needing attention. I repaired fillings and charged for them, and I am sure that I earned my fee. When a patient presents with many contacts which need attention, I would relieve the worst conditions first and gradually correct the others.

There is no reason why a proper fee should not be collected for applying a separator and trimming to proper form a filling that has been previously placed by another operator, although this service might not be mentioned to the patient or might not be entered as a separate item in the bill. We are certainly doing the patient a good service, and we are entitled to be paid for it. Any dentist can adopt this procedure and be properly paid for it, when he himself realizes the importance of the services rendered. An old practitioner told me that he did the poorest operating when he made the most money, when he rushed his work in order to care for more patients, and therefore slighted all operations. You cannot look after these little details if you practice dentistry in that way. A man will do better for himself and for his patients if he concludes not to treat all the patients who come to him, but performs his operations in the best possible way for a limited number.

Dr. LUTHER. I wish to extend to Dr. Black our most sincere thanks for the message that he has brought to the dentists of Western New York. The meeting now stands adjourned until tomorrow morning at 9 o'clock, when the clinics will be held.

(To be continued.)

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PHILADELPHIA, JUNE 1912.

EDITORIAL DEPARTMENT.

THE DENTAL NURSE.

THE woman assistant has come to be such a commonplace necessity in the conduct of a well-regulated dental practice that her presence excites neither criticism nor comment; indeed, so accustomed is the general public to her ministrations that her absence from a dental office has come to be even more noticeable than her presence.

The sphere of her activities eludes more precise definition than is suggested by the term assistant by which she is ordinarily designated, and so varied are the demands made upon her that it may be said in general that what she does in a dental office is limited mainly by her capacity and willingness. In a clerical capacity she may take care of accounts, keep books, look after routine correspondence, arrange for appointments, see that the office is kept neat and tidy, clean and sterilize instruments, prepare filling materials, assist at operations in the adjustment of the rubber dam, wield the hand-mallet, bake inlays, assist in taking impressions, also at the administration of anesthetics—in short, make herself useful to the limit of her ability. The woman assistant is as much of a necessity as is the telephone or any other similar convenience of modern life in connection with dental practice. In all of these relations she plays a conspicuous and important part and fulfils her office most admirably. It is within easy recollection that the woman assistant in a dental office was looked upon as a superfluity, if not as a symptom of professional snobbery—or, at any rate, to say the least, as a striking novelty. That period in the development of the woman dental assistant has definitely passed by, and she has not only created a field of the greatest usefulness for herself, but has come to stay.

In the fulness of time the attention of the dental profession has become strongly focused upon the fundamental importance of oral hygiene and the necessity for combating not only local lesions, but conditions of bodily ill health, by the establishment of normal mouth conditions through the agency of the so-called prophylactic treatment—provision for which, it is becoming gradually evident, must be made in every dental office which aims to render service in harmony with modern demands. The physical limitations which restrict the services that any individual practitioner can render may vary somewhat, but that the limitation in the aggregate is such as to bring effective dental service to no more than a minority of those needing it is self-evident. In a large practice, or even in an average practice, the demand upon the dentist for ordinary restorative operations in the repair of defective dental organs is quite sufficient to occupy nearly his whole time and energy, and to effectively carry on a system of prophylactic service so that his patients may receive the continuous benefit of such treatment as they now may rightfully demand at his hands involves an expansion of his working efficiency, either by his taking on a qualified associate in the capacity of assistant or partner, or by adopting the alternative of employing a specially trained assistant or assistants giving exclusive attention to the prophylactic treatment.

The necessity here outlined is not a hypothetical but a real one which is being increasingly felt by conscientious and progressive practitioners, and one which must in the further development of the oral hygiene propaganda become more imperatively insistent in the near future. The alternative of the "dental nurse"—by which is meant a woman assistant skilled in the surface treatment of teeth, with abilities sufficiently developed to intelligently remove deposits from the teeth and place them in a hygienic condition—presents a problem which, like all other progressive steps, has not only its advocates but its severe critics.

Two major objections have been made against the recognition of the dental nurse—the first one on sex grounds, viz, that as a woman she is not capable of developing the degree of manipulative skill or intelligence in its application sufficient to enable her to acceptably perform the work. Respecting which criticism it may be said that it is founded on a false assumption, the proof of its falsity being that woman as such has amply demonstrated her abilities, not only in this particular field but in many analogous fields, and that her abilities of the kind under consideration are fully equal to the related abilities of men. The time has long since passed when any objection to women fulfilling a function such as is proposed for the dental nurse can be successfully maintained upon the grounds of her sex.

The other major objection which has been urged against the dental nurse is that by granting her a legalized status a class division in dental practice is created which would open the door to abuses and tend to belittle the status of the dental degree. This latter objection is open to the suspicion of having its roots deep down in a spirit of professional commercialism which fears competition, but even from that viewpoint it would seem to be feasible to so amend our dental statutes that perfectly definite restrictions could be placed about the sphere of work of the trained dental nurse which would prohibit her from intrenching upon the territory of the more broadly qualified practitioner. On the other hand, if it should appear that it would not be possible to safeguard the more general qualifications of the legalized practitioner from encroachment by the dental nurse, or those who might attempt to practice dentistry under the limited qualification that would be required for the dental nurse, it is to be remembered that in practically all dental statutes provision is now made that nothing in the act shall interfere with an assistant performing dental operations under the immediate supervision of a qualified preceptor, and where such exceptions are noted in a dental statute they furnish ample protection for any practitioner who may desire to employ the services of a trained woman assistant in the capacity of a prophylactic assistant.

Whatever objections may be urged at present against the employment of the dental nurse in the capacity here under consideration, the trend of the time appears to be inevitably in favor of such a course, and it is highly probable that the near future will see the dental nurse as firmly intrenched in her field of activity and as efficiently serviceable therein as today we find the usual lady assistant in our modern dental offices.

BIBLIOGRAPHICAL.

A TEXT-BOOK OF DENTAL HISTOLOGY AND EMBRYOLOGY, INCLUDING LABORATORY DIRECTIONS. BY FREDERICK BOGUE NOYES, B.A., D.D.S., Professor of Histology, Northwestern University Dental School, Chicago. 12mo, 510 pages, with 350 illustrations and 19 plates. Cloth, $4.50 net. Philadelphia and New York: Lea & Febiger, 1912.

In his preface the author very truly says that for the successful treatment of disease in the dental tissues it is as indispensable that the dentist should acquire an intimate knowledge of their structure as that the physician should have a similar knowledge of the structures which he is called upon to treat. A knowledge of structure and function is necessary for an intelligent conception of the working of the animal body in health, and for the restoration of normal function when impaired by disease. In the light of these fundamental axioms Dr. Noyes has set forth in his text-book an exhibit of the histological structure of all of the dental tissues and their associated structures, sufficiently comprehensive in scope and explicit in detail to cover the ground with great completeness.

The subject is, however, treated not from the academic point of view, but rather from the standpoint of the needs of the student who will use the knowledge thus gained in the more intelligent conduct of his professional practice. The long and varied experience of Dr. Noyes as a teacher of dental histology, and his high repute both as an investigator and practitioner have abundantly qualified him for producing a book which thoroughly exemplifies the practicality of adapting scientific methods to the needs of dental practice. Wherever the characteristics of tissual structure bear upon operative technique or upon modes of treatment these important relationships are clearly pointed out. Moreover, the value of the work is enhanced by a clear setting forth of the various technique methods employed in this department of histological work, so that, besides being an excellent students' text-book, the work is an equally valuable laboratory guide, and will undoubtedly take first rank among the high-class text-books required in dental college teaching.

A few points of disparity in the views of certain authors quoted are noticeable in the work, and are undoubtedly inseparable from such a work in the present state of knowledge. For example, the question of the normal relationship of the cement and enamel appears still to be an open question, one class of authorities holding that at the cement-enamel junction the cementum overlaps the enamel, others stating that there is a space where the dentin is uncovered by the enamel and cementum. A similar difference of opinion exists with reference to the composition of enamel, the analysis by Von Bibra showing as much as 3.59 per cent. of organic matter, set down as cartilage and fat. On the other hand, Charles Tomes is quoted as holding that the enamel contains practically no organic matter. Incidentally, Charles Tomes is referred to as "Dr. Charles Tomes," a designation which has not to our knowledge heretofore been accorded him. That Dr. Noyes inclines to the opinion expressed by Mr. Tomes seems to be evident from his statement, at page 46, that "While the cementing substance and the substance of the rods are both entirely inorganic, or, more correctly, are composed entirely of mineral salts, they differ in physical and chemical properties as follows," etc. As the enamel rod is known to be originally formed from the combination of calcium salts with protoplasmic elements which in their combination produce the substance known as calcoglobulin, it may be considered questionable whether it is strictly correct—even in the face of what evidence has been accumulated, apparently—whether to apply the term inorganic to the enamel is strictly correct in a chemical sense, although it may be correct in an academic or histological sense. Dr. Noyes adheres to the term "atrophy" as descriptive of certain enamel defects, defining atrophy as "a disturbance in the structure of the enamel caused by an arrest or perversion of function of the enamel-forming tissue during development." The process described does not accord with the definition of atrophy as applied to other disturbances of function or development where tissues or organs other than the enamel are under consideration, atrophy in its essence being applied to a degenerative process in a tissue which has previously developed normally. We believe that the term hypoplasia more nearly describes the condition of the enamel which Dr. Noyes designates by the term atrophy, the former being in general use by scientific histo-pathologists.

The work would constitute a more valuable presentation of the subject if the author had included a wider range of references to the more recent work of numerous continental workers in histology whose additions to the subject have been of the utmost importance. Such a plan would have relieved the work of a certain flavor of localism that should be avoided in all works of a broadly scientific character.

The work is singularly free from features which would form the proper basis of adverse criticism, and we congratulate not only the author, but the dental profession, upon the appearance of this excellent and authoritative text-book.

REVIEW OF CURRENT DENTAL LITERATURE.

[*Oesterreichische Zeitschrift fuer Stomatologie*, Vienna, February 1912.]

CONTRIBUTIONS TO THE PROBLEM OF RESECTION OF THE ROOT-APEX. By DR. V. FREY, VIENNA.

Resection of the apex of abscessed or necrosed roots, after having been practiced successfully in Europe for years, is gradually gaining advocates in this country, and Frey's practical hints regarding the details of the technique of this operation, which is often the last resort toward saving a tooth, may prove valuable. One of the most disputed points of the operation is whether the canal of the root to be amputated should be filled before or after the operation. Frey prefers filling the root after resection, for the following reasons: By introducing a Miller broach from the cavity into the root-canal, the length of the root and the place where the alveolus is to be opened into can be fairly accurately ascertained. Mistakes may of course occur if a small cyst is present at the root-apex, no sign of pain being given by the patient until the broach penetrates the distal wall of the cyst. In most cases, however, broaching will give valuable indications. By means of these smooth broaches it is also possible to ascertain the relationship of the root-apex to the abscess, which is specially valuable in tortuous roots. After resecting the root-apex, flexible, thin root-canal reamers of consecutively larger sizes are introduced into the root-canal, thereby producing a perfectly round canal, guaranteeing the best possible adaptation of the root-canal filling material and insuring complete removal of any infected portions of dentin. For upper incisors, canines, bicuspids and the lingual roots of upper molars, the straight engine handpiece is to be used, while for the buccal root of upper molars and all lower teeth the right-angle handpiece must be resorted to. As resections are necessary in an overwhelming majority of upper teeth only, the right-angle handpiece will rarely be necessary. After reaming the root, the canal can be sterilized by hydrogen dioxid applied with a syringe, the incised soft tissues to be protected with a tampon.

Frey's technique of operating is as follows: After rinsing the mouth with an antiseptic solution and swabbing the field of operation with tincture of iodin, local anesthesia is induced by lingual and labial injections of two per cent. novocain, to which from one to one and one-half drops of a 1: 1000 solution of paranephrin (Merck) per one cc. novocain have been added. During the waiting period of from 10 to 15 minutes, the operator and his assistant have ample time to sterilize their hands thoroughly. While the assistant raises the patient's lip or cheek, a semicircular incision in the gingival tissue over the infected root is made, the flap of mucous membrane and periosteum raised, and the bony alveolus opened, first with a large rosehead bur, then a fissure bur. The aperture is enlarged with a large round bur such as is used for vulcanite work. All granulation tissue is removed, the root-apex drilled away, as well as all granulation tissue lining the abscess cavity, the wound is rinsed with hydrogen dioxid, the root-canal probed from the cavity, reamed with root-canal reamers, syringed with hydrogen dioxid, and the wound temporarily tamponed. The canal is then dried and filled with thinly mixed Ames' cement and a gutta-percha point. The visible excess of the gutta-percha point is cut off flush with the resected root, the rough root and bone surfaces are polished, the wound is once more rinsed with hydrogen dioxid, and then filled with a tampon of iodoform gauze, which is renewed every five or seven days. Healing takes place within from two to three weeks. The healing process may be accelerated by suturing, yet tamponing is safer. Post-operative pains and insomnia may be combated by giving the patient one capsule containing pyramidon 0.3 to 0.5 gram, morphin muriate 0.003 to 0.005

gram, before retiring, or at most two capsules per day. The patient should rinse the mouth from four to five times daily with tepid dilute hydrogen dioxid, and apply dry heat to the cheek. If edema occurs, it reaches its climax on the second day, and disappears usually not later than the fifth day. To avoid perforating into the antrum of Highmore or the inferior nasal meatus, large burs should be carefully used in opening up the alveolus and curetting the bone. A radiograph will furnish valuable data as to position of the root-apex, and aid in avoiding untoward accidents by perforation.

[*Les Annales Dentaires*, Paris, January 1912.]

EFFECTS OF MERCURY UPON THE TEETH AND THE MAXILLÆ. By Dr. E. Amend, Metz.

While inflammation of the pericementum without pus or abscess formation, loosening and elongation of the teeth without pain, swelling and deep red color of the gums, the presence of a gray mucoid false membrane, and fetid breath, are familiar symptoms of mercurial poisoning. Amend observed some far more serious symptoms in the following case, which seems unique: A petty officer, about forty years of age and of sickly appearance, presented for dental treatment. Several of his upper and lower teeth were missing, and the remaining ones had elongated. The patient gave a history of mercurial treatment, followed by severe oral inflammation, and subsequent loss of several teeth. In preparing the cavities, it was noted that the dentin was exceedingly dry and soft, behaving under the bur like fine, dry sand. No pain or thermal response was present, and it was found that the pulps in all teeth had become calcified, filling the chambers and canals in a solid mass. No complications followed the filling operations. The patient wishing to have one of the most elongated teeth replaced in its alveolus, an elastic rubber band, attached to the neighboring tooth on each side, was stretched across the masticating surface of the tooth to be reduced, and the patient was instructed to return the following day. When he returned, four days afterward, the rubber band was still in place, but the tooth had disappeared. Upon examination it was found to have entirely pierced the alveolus, so as to be out of sight. After incision in the gingiva, it was removed with forceps without pain, the bone proving to be entirely friable and soft. The patient left without returning, and was reported dead three months afterward. Repeated mercurial treatments, which the patient did not mention in giving his history, seem to have brought about a complete alteration in the substance and texture of the patient's bones, especially his maxillæ and teeth. How far this degenerative change extended in the maxillæ could not be ascertained; it undoubtedly was the cause of the patient's subsequent death.

[*New York Medical Journal*, New York, March 23, 1912.]

PLASTIC ROENTGENOGRAPHY. By W. H. Dieffenbach, M.D., New York.

The intense interest which is being evinced by the dental profession in all improvements of radiography may justify a brief abstract of Dr. Dieffenbach's utilization of the method originated by Dr. B. Alexander of Hungary. The plastic radiographs accompanying his article are a revelation in clearness, and demonstrate the existence of calculi and show the details of shape and structure better than can be seen stereoscopically or otherwise. Such radiographs should be of especial value when fine detail is desired, and render the diagnosis easier, particularly for such operators as have not had much training or experience in the interpretation of Roentgen shadows. The technique employed is as follows:

(1) Lumière X ray and slow plates are employed.

(2) Heavy anode tubes, 6 to 8 Benoist penetration, are used, the exposure depending upon the lesion to be X-rayed. With the solace apparatus we expose from two to eight seconds for calculi, while from one to two seconds' exposure is given to thoracic or small joint pictures. Instantaneous work is not favored, as it has been found that detail is often lacking in the plate upon too rapid exposure, while a second or more of exposure harms neither the tube nor the patient. The meter is usually held at 30 m.a. through the tube.

(3) Indirect rays are eliminated as much as possible by the use of the compression diaphragm and the loofah pad filter.

(4) The plate is developed, fixed, washed,

and dried in the usual manner, excess of contrast in development being avoided.

(5) A positive is next made from the negative plate, using a slow plate, and exposing the same in the printing-frame carefully. Fogging is avoided, and the attempt is always made to secure equal density.

(6) Both plates, when dry, have their glass surface carefully cleansed, and these are then placed together, making the outlines register accurately by holding them up to a good north light. When good approximation has been secured, the plates are firmly bound together with lantern-slide binders.

(7) These joined plates are then placed in the printing-frame, using the positive side to print from, and employing a slow bromid glossy paper (carbo and portrait argo). Exposure is regulated according to the character of the light, the frame being placed at an angle of forty-five degrees in a north light.

(8) The paper is next developed in an antifriction developer, rinsed, fixed in a fresh hypo bath, and when washed is ready for mounting.

If permanent records on plates are desired, another plate must be made from the plates as above described—instead of paper—and the prints can be subsequently secured from a fourth plate taken from the third. Thus plates one and two, as described above, furnish plate three; from plate three the fourth plate is secured, and the latter is the permanent record for subsequent prints.

[*Deutsche Monatsschrift fuer Zahnheilkunde*, Berlin, February 1912.]

THE PRESENT STATUS OF ROOT-CANAL TREATMENT IN RELATION TO THE MINUTE ANATOMY OF THE ROOT-CANALS IN MAN, ESPECIALLY AT THE APICAL FORAMEN. By Dr. Guido Fischer, Marburg.

No subject in dental science has probably been more carefully studied, and none seems of greater importance, than the treatment of root-canals, yet the present accepted theories of root-canal treatment and filling seem to suffer somewhat of a setback in the light of Fischer's researches into the minute anatomy of root-canals, especially in the region of the apical foramen. Fischer, whose text-book on the "Structure and Development of the Oral Cavity in Man" we have reviewed in Dental Cosmos, 1910, vol. lii, p. 242, is singularly fitted to speak authoritatively on this subject, and his beautiful preparations, photographs, and photomicrographs seem to bear out fully his contention that the pulps in all human teeth have an inclination to divide into several branches, slightly above the apical foramen. This observation, which, in view of his illustrative material can hardly be doubted, is of the greatest practical importance, and explains the many failures that follow even the most scientific and conscientious mechanical removal of pulp débris, sterilization of the root-canal, and filling after generally approved methods. Fischer maintains that all pulp extirpations in adult teeth, even in incisors, are uncertain. Little tendrils of pulp tissue always remain behind in the apical region. He therefore recommends amputating the crown portion of the pulp after removal of the arsenous paste, and sealing in a dressing of 2:1 tricresol formalin for from five to eight days, for the purpose of hardening and tanning the pulp stumps. This dressing may be practically dipped in pure tannin before being sealed in. The pulp tissue thus treated can be more easily removed *en masse*, and any remaining minute portions are fully impregnated with the antiseptic. If insufficiently devitalized pulp tendrils remain in the apical region, pulpitis will set in; it is therefore necessary to prolong the action of the arsenous paste for a sufficient length of time, *i.e.* not less than three days. If a pulp has been putrescent, infected centers may remain in the pulpal network near the apical foramen, and set up new pathological processes. Most failures of root-canal fillings are to be ascribed to these centers of infection, also numerous granulomata, root-cysts, fistulæ, etc. This also explains all forms of partial periodontitis, where the inflammation may have its original source in a side canal, as well as the trying conditions of inflammation and sensitivity which frequently do not abate even after every known means of root-canal treatment have been exhausted. In such cases the great advantage of resection of the root apex is self-suggesting.

In the light of the above findings, the attempts at mummification of pulp stumps, which have never been favorably looked upon by the American dental profession, seem fully justified; yet, so far, no satisfactory agent for mummification has been found. Fischer is at present engaged in experiments with a permanent antiseptic, which will exert a lasting antiseptic influence upon the minute pulp tendrils remaining almost invariably in the apical region. The outcome of these experiments may be looked for with interest. For the present, he recommends, as a root-canal filling material, paraffin with thymol admixture melted into the canals after as careful mechanical removal of pulp débris as possible and sterilization of the canal. The heat necessary for introducing this thymol-paraffin into the canals he considers of decided advantage. In putrescent pulps the filling process is the same, after extensive tricresol-formalin treatment.

[*Revista Dental*, Habana, Cuba, 1911, No. 5.]

THE THEORY OF ACQUIRED IMMUNITY IN THE TREATMENT OF PYORRHEA ALVEOLARIS. BY DR. M. A. WEISS, HAVANA.

After discussing Hopewell-Smith's work on the Histo-pathology of Pyorrhea Alveolaris and the local and general causes of this disease, Weiss bespeaks a close study of the intimate phagocytic phenomena which occur, although without positive results, in pyorrhea alveolaris in the infected gingival alveolo-dental region. In pyorrhea, the defensive power of the organism, as a result of the diathesis or constitutional state, does not possess its normal integrity; the chemotactic sensitivity of the phagocytes is attenuated throughout the organism. This explains how the infection makes its entrance into the alveolar region. As soon as this has taken place, phagocytosis begins, but under very unfavorable conditions. There is no uniformity in the combating forces, and although the inflammatory and necrotic process reveals the vital protest in the struggle between the leucocyte and the bacteria, the phagocyte is soon overcome, and the local infection continues its destructive course.

This is solely due to the general cause, to the constitutional state, which, by depriving the phagocytic cells of vital energies of resistance, places them at a disadvantage for the struggle against the bacteria possessing such great virulence as the staphylococci, the streptococci, Gallippe's diplococcus alpha and beta, etc.

Just as we obtain a general immunity, a superior phagocytic power, and thereby innocuousness of the pathogenic bacteria or of some of them, could we not obtain a local immunity in the alveolo-dental regions? Could we not establish a local phagocytosis in the tissues about to be invaded, and, after this transformation, put our faith in the prophylactic, caustic, and antiseptic treatment applied locally?

In trying to solve this problem, Weiss injects into the tissues about to suffer lesions in cases of pyorrhea not yet too far advanced, two centigrams of Doyen's staphylase for one tooth, making the injection in two teeth during one sitting. This injection should be made deeply in the alveolar periosteum, also in the diploe. The result of these injections is awaited, while making new ones, for a period of four days. Topical applications of caustics and antiseptic mouth-washes are made at the same time, after most carefully removing the sordes and serumal calculus present.

Staphylase is chosen for this immunization because the staphylococcus pyogenes albus and aureus are constantly found in pyorrheal pus.

In less advanced cases of pyorrhea, where the formation of pus pockets has just begun, the treatment is modified in regard to the substance injected, which in these incipient cases consists of sodium nucleinate.

In this way Weiss hopes to endow the alveolo-dental region with an acquired immunity, and to overcome pyorrhea by an increase of phagocytic power of the tissues involved.

[*Revue Trimestrielle Belge de Stomatologie*, Antwerp, December 1911.]

NOTES ON THE TAKING OF PLASTER IMPRESSIONS. BY DR. P. DEPIESSE, BRUSSELS.

In order to overcome the difficulties often encountered in taking plaster impressions, viz, inaccuracy of the impression and nausea on the patient's part, the author first takes an approximate impression of the mouth with impression material, and pours a model thereof. He then selects an impression tray that approximately fits that model, coating the tray with a thin layer of wax, building up high portions according to necessity, and constructing a rim of wax at the posterior portion of the tray to prevent plaster from flowing down the patient's throat. To facilitate the separation of the plaster model from the impression, shallow longitudinal ribs can be built up in the impression tray, which will form lines of lesser resistance along which the plaster of the impression will break away more readily from the model, and danger of breaking off teeth from the model is avoided. For taking the impression, the plaster is mixed to a creamy consistence; a very small quantity of plaster is needed if the tray has been prepared as described, so that the distance between the wax layer and the tissues of the mouth is uniform all over.

For separating the model from the impression, the impression is allowed to soak in water for fifteen minutes. The plaster is thus impregnated with water, and absorbs only a thin film of oil on its surface, thus preserving all the details of the impression, which is rendered inaccurate by oil or separating fluids applied to it in a dry state.

For removing impression material from a tray, the author recommends pouring a few drops of oil into the tray, heating it directly over the Bunsen burner, and rubbing off with a rag, when every trace of the impression material will come off without effort.

[*Archiv fuer Zahnheilkunde*, Dresden, January 1912.]

PRACTICAL HINTS FOR SILICATE CEMENT FILLINGS. By Dr. Adelheid Jacobi, Goerlitz.

Many operators and patients give silicate fillings the preference over gold and gold inlays for cosmetic and economic reasons, or over porcelain inlays for the latter reason. Still, the usefulness of silicate cements is doubted by many, although, if they are properly manipulated and inserted in their proper place—*i.e.* in anterior teeth—they are better than their reputation.

In inserting silicate cement fillings, the most minute factor must be carefully observed. Before adjusting the rubber dam, the occlusion should be noted to see where and how the antagonistic teeth occlude with the teeth to be filled, whether the cusps or surfaces of the antagonists would disturb the prospective filling, or how high the filling should be built up. In case of very close bite the patient is asked to close, after the cement has been introduced into the cavity and before the filling is finished and polished. The impression left by the antagonist through the rubber dam shows how the contour should be built up, thus avoiding untoward grinding afterward. After removing the rubber dam, the filling is protected by varnish, and then articulating paper is laid between the filling and the antagonist. This does not spoil the filling, as the blue color adheres to the varnish only. If the articulation requires some slight improvement, it is better to grind a prominent cusp or surface of the antagonist. The filling should never be exposed to great stress from the antagonist, thus avoiding any chipping of the cement or forcing of the filling from a shallow cavity. In very crowded teeth, when even the finest instrument or a celluloid strip cannot be passed without damaging the shape of an approximal filling, a narrow rubber-dam strip coated with vaselin will be found convenient for adapting the filling closely to the cavity margins and for smoothing the approximal surface. Tantalum instruments, which are now to be had in many different forms, can be subjected to great pressure, and are preferable to agate instruments, which break easily and are generally too thick and clumsy.

It is important to instruct the patients that teeth filled with silicate cement must be kept scrupulously clean. Brushing upon arising and before retiring is not sufficient, but the interproximal spaces must be freed of food débris after every meal with waxed silk floss. In this way the filling is kept smooth and clean, and cannot be so rapidly destroyed by nascent acids. Patients should always be supplied with a box of silk floss before leaving the office, and shown how little time and trouble it requires to preserve the teeth and fillings for years.

[*Monthly Cyclopedia and Medical Bulletin*, Philadelphia, March 1912.]

IMPERFECTIONS IN THE DIAGNOSIS AND TREATMENT OF PATHOLOGICAL CONDITIONS OF THE TEETH AND JAWS. By Robert H. Ivy, M.D., D.D.S.

In discussing the separation of the medical and dental professions which has brought about a divergence in the teaching of pathology in the two schools, Ivy says that, generally, the physician knows little of the lesions of the teeth, while the dentist is ignorant of general pathological processes. The disastrous effects of such lack of knowledge are frequently seen in cases in which a little broader education on the part of the dentist or less indifference to dental lesions by the physician would have resulted in a true interpretation of the signs and symptoms presented, and in a rational basis for treatment. In contrast to the tendency on the part of some physicians to value lightly the preservation of the dental organs, the dentist too frequently attempts to preserve teeth that should be extracted. No attempt should be made to save teeth with abscesses discharging into the maxillary sinus or externally on the face or neck. In exceptional instances a healthy condition is regained without loss of these teeth, but in the great majority they must be sacrificed.

Better conditions would be brought about for the physician by a short course in our medical schools on pathological processes of the teeth and jaws, with their diagnosis and treatment. Such a course would include a study of the pathology, symptoms, and emergency treatment of dental caries, pulpitis, pericementitis, and alveolar abscess; the recognition of various other lesions of the teeth, different forms of stomatitis, and impacted teeth; diagnosis of oral conditions responsible for trifacial neuralgia and other local and general disturbances; the special treatment of fractures of the jaws and their complications, and many other conditions that at the present time do not receive sufficient attention in medical schools.

The ideal education, in Ivy's opinion, for the dentist would be the complete medical course leading to the degree of Doctor of Medicine, followed afterward by the special training required in dental operations, which course would make of dentistry a true specialty of medicine on a par with laryngology, gynecology, and the other specialties, instead of being, as it now is, an almost independent profession. This is rendered impracticable as a regular plan by the large amount of training necessary to the efficient performance of this reparative work. The most practical way of meeting the difficulty is to educate the dentist more broadly in the principles of pathology, medicine, and surgery. The student, in addition to adequate courses in chemistry, anatomy, physiology, and bacteriology such as are already required, should have instruction in general pathology and in physical diagnosis, with a few hours in clinical medicine, and more particularly in surgery. Practical work in a general surgical dispensary would be of the greatest assistance to him and would broaden his view in the diagnosis and treatment of diseases of the jaws and teeth.

The treatment of hospital patients suffering from various pathological conditions of the jaws would be greatly improved by having in all large hospitals graduate dentists as internes. This has been done at the Philadelphia General Hospital for the past eleven years. The dental internes not only have the care of injuries and diseases of the jaws, but also look after the oral hygiene of all cases in the hospital. This co-operation of physician and dentist is of inestimable value to the patient and to the hospital, and is mutually beneficial in the education of the internes themselves.

PERISCOPE.

Solvent for Cocain in Pulp Anesthesia.—In pulp anesthesia it is advisable to use a ten per cent. solution of menthol for dissolving the cocain to be employed.—H. E. LATCHAM, *Dental Review.*

Considerations in the Preservation of Bicuspids.—From a close study of the location, anatomy, architectural design, and functions of the bicuspids are revealed the following facts:

(1) From a self-cleansing and flushing standpoint, they occupy the weakest strategical position in the entire arch to resist the onslaughts of the enemies with which they are constantly battling.

(2) Owing to their close proximity to the antrum of Highmore in the upper jaw and the mental foramen in the lower, they are quite liable to be associated with antral troubles and reflex nervous disorders, which may markedly lessen their period of usefulness.

(3) Owing to the frequent possession of long cornua, with consequent tendency to pulp exposure, together with the occasional possession of long, small canals, especially in the lower jaw, and the variations in conditions with reference to bifurcation of the canals in the upper jaw, they are markedly subject to pulp disturbances and affections following imperfect canal operations.

(4) Their strength to resist crushing stress depends largely on the system of stanchions, girders and buttresses in their anatomical structure, the loss of which, through any cause, markedly weakens them and shortens their period of usefulness.—W. H. O. McGEHEE, *Dental Summary.*

Gold Inlay Bridge Cast in One Piece.—In the construction of cast inlay bridges it is customary to cast the inlays separately, place them in position, take the bite and impression, run up a model, and from it construct the portions to be supplied, casting them separately, then investing and soldering all together. This is a tremendous waste of time and labor, as the bridge can be cast in one piece and all the above different steps be avoided, by making the wax model for the bridge in the mouth, carving as desired; as the access to the margins is good, the model can be removed and replaced as often as desired, and the utmost accuracy be obtained.

After the cavities are properly prepared, care being taken to so prepare them that the model can be readily withdrawn, place modeling compound in the spaces to be restored, allowing sufficient room between it and the occluding teeth to permit of the desired length of the restoration, and, after chilling, carve out adjacent to the prepared cavities. Then place the inlay wax in position and require the patient to bring the teeth together as in "taking the bite." The wax should be chilled, removed from the mouth and carved, being returned as often as may be necessary for verification of bite, margins, etc., and the operator can thus assure himself that the model is perfect before investing it.

The casting in the Taggart machine does not show any perceptible distortion—in which alone could lie any possible objection to this method. I have frequently cast five-tooth bridges, consisting of three inlays and two dummies, and results have been most satisfactory.—G. T. BANZET, *Dental Brief.*

Local Treatment with Salvarsan in Spirochetic Diseases of the Oral Cavity.—The specific anti-bacterial property of salvarsan has been demonstrated in the early stages of syphilis, where the spirochetæ disappeared in the lesions of the oral cavity. Gerber, Rumpel, and Plaut advocated the use of salvarsan in non-specific ulcerous spirochetic diseases of the oral cavity, and obtained remarkably good results in two cases of Plaut-Vincent's angina, and in one case of scurvy. The author reports a case of post-traumatic mandibular osteomyelitis, due to spirocheta dentium, in which, three days after injection of 0.6 gr. of salvarsan, neither the pus nor the sequestrum spirochetæ were to be found. The local application of salvarsan is indicated in (1) specific local lesions in the oral cavity, (2) non-specific ulcerous lesions, and (3) necrotic and gangrenous pulps, and as a substitute for arsenic in pulp destruction. The local application is very simple, the salvarsan being administered in a 10 per cent. solution of water or glycerin. The ulcers are wiped with physiological salt solution of body temperature, and then painted with salvarsan. For stomatological purposes the author advocates the use of salvarsan, suspended in paraffin, especially for pulp destruction, because the salvarsan, in forming a deposit in the pulp chamber, acts both as an antiseptic agent and as a substitute for arsenic. Salvarsan destroys both the spirochetæ and fusiform bacteria. Quick staining by the Shamine method permits of differentiating between the spirocheta pallida and the spirocheta dentium.—T. Zilz, *Muenchener Med. Wochenschrift* per *Dental Surgeon.*

Retention Plate of Rubber in Orthodontia Cases of Classes II and III.—For the last four years, the writer has retained cases of classes II and III with the so-much criticized retention plates of vulcanized rubber, and has obtained surprisingly good results with these.

This retention plate of vulcanized rubber constitutes the mold about which the softened alveolar processes consolidates, and wherein the more or less loosened teeth find their support until they are firm in their sockets, or during the time of retention.

The plate covers and fits into the finest lines and contours of the gums, and by extending up on the lingual surfaces and around the approximal surfaces, as far as the case will permit, it grasps the teeth fairly firmly without being a hindrance to the occlusion.

The pressure which the tongue exerts on the teeth and processes forward and laterally during masticating, swallowing, and talking, is eliminated by the plate, for the reason that the pressure is evenly distributed over the inner side of the alveolar processes, and in the upper jaw the hard palate also gives support. Vulcanized retention plates have been used as retainers after the expansion of the arches, and it has been claimed that the incisors and canines, by their tendencies to move lingually and by their lingually sloping surfaces, would dislocate the plate. This has not been the case, so far as the writer has observed, because the plate is held firmly in place, first, by adhesion to the mucous membrane, secondly by the pressure of the tongue, and thirdly by the lower incisors which support it during occlusion.—C. Skogsborg, *Items of Interest.*

Syphilitic Infection Transmitted by Non-sterilized Cotton Holder.—The receptacle with little perforations for holding cotton for immediate use is as dangerous as convenient. Should the dentist's fingers be contaminated with the syphilitic virus, in his manipulation to withdraw a portion of the cotton, the holder and the remaining cotton are sure to be smirched. Naturally, before the next patient comes to the chair, the dentist washes his hands—not forgetting to use a delicately perfumed soap—and rearranges his table and instruments, forgetting or perhaps not knowing that he has contaminated the metal box and the contained cotton. His second patient requires the use of cotton, and he reaches over and pulls out the desired amount. His fingers come in contact with the germ-laden holder and carry away cotton impregnated with the virus. This comes in contact with the patient, and if there is a break in continuity the virus will be absorbed and syphilis will follow. To avoid this calamity the cotton previously sterilized should be removed from the surgically clean receptacle with sterile forceps. The cotton can be placed on a sterile towel and the forceps still remain clean. In this way asepsis is maintained. Or the cotton and box may be sterilized before and after every patient, whether known to be syphilitic or otherwise. The little details are what count in maintaining surgical cleanliness, and the method of taking care of the cotton holder may be applied to other articles of the dentist's armamentarium.—S. S. Wilcox, *Dental Summary.*

Caution in the Use of Aluminum Plates.—Before using to any great extent aluminum plates, it may save much loss and disappointment to note how often this material has come and gone since it was first suggested as a base for artificial dentures over half a century ago. Its lightness, the readiness with which it can be wrought, its cleanliness, and its beauty when nicely molded and polished, are enchanting. Its chemical behavior is tantalizing, and has always resulted in its being discarded sooner or later by its most enthusiastic admirers. Its behavior with some acids places it close to the noble metals, and its resistance to atmospheric conditions has been noted as remarkable. It is vulnerable to the alkalis, it is slowly dissolved in the body fluids and in some oral secretions. In some mouths it endures a long time, in others it quickly disintegrates. When aluminum was produced by the older methods this uncertain behavior was said to be due to its containing impurities; later methods produce a metal practically pure, but no more dependable when exposed to oral secretions than that of former days. The dentist who is fortunate enough to first use it in the mouth where it quickly proves incompatible is to be congratulated. Its use in surgery as a temporary splint in fractures is suggestive. When so used, in a year or two it entirely disappears, slowly dissolved and removed by the alkaline body fluids. It has failed to secure a permanent place among the desirable bases for artificial dentures, for good and sufficient reasons.—W. H. TRUEMAN, *Dental Brief.*

Diagnostic Symptoms of Angina.—When the teeth are the starting-point, the inflammation involves the periosteum of the lower jaw and thence all the surrounding tissues. No matter how it commences, it spreads along the connective tissue by direct continuity. In these cases it is not transmitted by lymphatics. The lymphatic glands do not become enlarged by infection carried to them through the lymph stream from the infected focus, but they are involved by the connective tissue surrounding them.

The disease is characterized by febrile disturbances, chills, and high fevers, which are soon followed by difficulty in mastication and deglutition, and this may suddenly occur in an otherwise healthy individual. In the region of the submaxillary gland a hard, indurated, and sensitive tumor makes its appearance, which cannot be definitely outlined as in a more superficial glandular involvement. There is an infiltration of the connective tissue which surrounds the muscles of the neck, and of the alveolar lingual sulcus, the soft palate, and the pharynx. Marked redness of the skin does not manifest itself at first, but later, when the swelling has invaded the cellular tissues of the whole affected side, the neck is distended, hot, red, and inflamed, which conveys a boggy sensation to the palpating fingers and readily pits on pressure. As the sublingual cellular tissues become engorged, the tongue is of necessity forced upward, causing the mouth to open and the tip of the tongue to protrude. There is more or less ankylosis of the jaws, and the partially open mouth allows a free escape of saliva, which is of a foul odor. If this condition is not relieved, spontaneously or surgically, the pressure symptoms become more pronounced, the tongue presses backward and downward against the glottis, causing constriction, edema, and death.

Two of the features which are usually constant in the condition are the wood-like hardness of the floor of the mouth and the marked dyspnea.

Of 106 cases reported by Thomas, dental caries was noted in 36 cases as being the primary focus of infection, the third molar being involved in four. So far as reference to special teeth is concerned, they were always molars, usually the third lower, those nearest to the submaxillary region.—C. N. RUSSELL, *Garretsonian.*

Anchorage of Cast Gold Inlays.—A serviceable anchorage for cast gold inlays consists in the use of a detached anchor pin of gold wire of the same karat as the inlay. This is applicable, broadly speaking, to those cases in which the complex shape of the cavity would make it difficult if not impossible to withdraw the wax form when of a shape sufficiently suitable for retention, and in cases where the width and shallowness of a cavity would necessitate excessive excavation of sound tooth structure to obtain anchorage. Under the latter class would be included the restoration of the incisal edge, the cusps of molars and bicuspids, etc.

The mode of procedure is simple. All that is necessary is an engine drill of the same diameter as the anchor pin. The depth of the pit made with this drill depends on the judgment of the operator, but in most cases it need not be deep. The pin, however, should fit snugly into it and not be too loose. With the pin thus in position and left rather long, the wax is forced into the cavity and trimmed up and the sprue wire inserted. After chilling, the surplus portion of the anchor pin is grasped in the pliers and rotated carefully half a turn, when it can be readily withdrawn, the wax form being firmly held in position in the cavity. The wax form is now removed from the cavity and invested, special attention being given to the hole for the reception of the anchor pin. This must be completely filled by working the investing material through with a camel's-hair brush. This is done easily by confining attention to one end of the canal and pushing the investment in little by little until it oozes out at the other end, when the whole of the wax form may be coated over and completely embedded.

After casting, it will be found that the anchor pin fits exactly without the necessity of doing anything to the canal other than completely cleansing it from all traces of investing material. In fixing the finished inlay in the cavity the anchor pin must be thrust home while the cement is still soft, and it is well to coat the pin itself with a thin layer. When the cement is set, the excess of the pin is cut off and ground flush with the surface of the inlay.—W. A. HARROP, *Dental Record.*

HINTS, QUERIES, AND COMMENTS.

PORCELAIN *VS.* GOLD: THE ELECTROTYPED MATRIX FOR PORCELAIN WORK.

WITH the advent of the casting process and its subsequent perfection, many of us discontinued almost entirely the use of "home-made" porcelain. The present prestige of gold, however, is due more to the accurate and easy method of its manipulation than to its own inherent qualities. On the other hand, porcelain has been severely handicapped by the present method of securing a matrix for the work—a process that is tedious, difficult, impossible in a great many cases, and inaccurate at best.

The writer's suggestion to electrotype the matrix over the wax impression of the cavity (page 385, March COSMOS), overcomes these objections to porcelain. Where the occlusal surface of the tooth is extensively involved, the matrix may be made to include this portion of the wax model. A substantial modeling compound may be very advantageously substituted for the wax, thus preventing the possibility of distortion, and permitting a sharp marginal impression of cavities that encroach upon the gums.

By the same process, a matrix can be obtained for an all-porcelain bridge having perfect occlusion, the metal foundations of which may be connected by a strengthening piece of iridio-platinum wire. The matrix is electrotyped over the occlusal and buccal surfaces only, the balance being left open for the introduction of the porcelain. The entire buccal portion of the bridge may be carved in wax, thereby avoiding the necessity for using porcelain facings.

While it seldom happens that we are unable to get the desired facing from the manufacturers, when that does occur, the electrotyping process affords us a means of producing the proper tooth from an accurate wax model.

A copper matrix can be employed, but the use of gold is preferable. However, in large pieces of work, where the cost of gold makes its use prohibitive, a gold-lined copper matrix may be utilized by first electroplating an extremely thin coating of gold over the wax model, and then suspending the same in a copper electrotyping solution for reinforcement. This method can be used to obtain a matrix for exactly reproducing the natural gums in one solid layer of pink porcelain, an esthetic result long looked for by the profession.

A gold-lined plaster mold for accurately casting porcelain can be made by adjusting a cone-shaped wax sprue to the wax model of the cavity, and then electroplating over the entire wax surface, with the exception of the base of the sprue, which when invested becomes the entrance to the mold after the wax has been burned out. The mold must be forcibly syringed by a suitable solution to eject all of the plumbago. The lining matrix of the mold may be made in two separable portions, facilitating the cleansing of the matrix before casting, and making it easier to remove the lining from the mold after the process is complete.

An all-porcelain crown with platinum pivot can be perfectly adapted to the root by means of the electrotyping process, briefly as follows: First adapt a well-selected pivot tooth to the root with wax. Remove with wax intact, and then electrotype over the surface of the wax which came in actual contact with the root. Next invest, burn out the wax, and substitute baked porcelain. It would be well if the manufacturers would supply us with a tooth the lingual portion of which would be adapted to this process.

To the writer's knowledge there is no easier or more accurate way of reproducing the counterpart of a surface than by the electrotyping process, and he believes that its adaptation to porcelain work will not only revive the waning enthusiasm for home-made porcelain, but will justly give it first choice for visible restorations, a position which cast gold can no longer dispute.

O. W. Briner, D.D.S.

New York city.

FOR FINISHING WAX IMPRESSIONS IN INLAY WORK.

After the wax is inserted and has been partly carved to conform to the outline of the cavity, a very fine sandpaper strip is very carefully run over the contoured surface of the wax; this will leave a much smoother surface than can be obtained in any other way, and at the same time will accurately burnish the wax to the margins of the cavity. Care should be taken not to supply much pressure to the strip.

Leon C. Patterson.

Lincoln, Nebr.

A HINT REGARDING THE USE OF THE RUBBER DAM.

The rubber dam is still necessary in many dental operations. Yet how many operators have ever stopped to think why the patients dislike it so much? If they would chew a piece of dam, as it comes from the dental depot they would learn one reason, for rubber dam not only tastes badly, it also has a most unpleasant odor. Both these factors, evil taste and odor, as well as the general cleanliness of rubber dam, may be improved by simply washing it before use. For this purpose, first soap and water are employed; then the piece of dam is rinsed in clear water, and next washed in water to which a liberal amount of mouth-wash has been added. It is then hung up and allowed to dry. After the dam has thoroughly dried, a coat of borated talcum powder is dusted upon it, when the dam is ready for use. By chewing a small piece, the operator can readily convince himself of the marked improvement which this treatment imparts to the rubber.

C. M. Torrance, D.D.S.

Frankfort-on-Main, Ger.

UNHYGIENIC BRIDGE WORK—MALPRACTICE.

I have been obliged to remove a fixed bridge for a patient on account of breakage. This bridge comprised two gold crowns, covering the lower left canine and second molar, connected by a saddle of about three-eighths of an inch in width. This saddle consisted of a single piece of gold plate of about 29 gage. It was flat on the ridge, and had soldered to it three posts or pivots which supported three detachable crowns cemented to these saddle posts. The gum tissue was swollen and inflamed, and the fetor from the mouth was most offensive. It was evidently impossible to keep this appliance clean, and on removal, decayed matter was found to coat the under side of the bridge.

This "bridge" was inserted by a so-called high-priced and first-class dental operator in Boston. The patient related that this dentist had told him that the bridge must not be used for mastication. A fixed bridge of such construction, in my opinion, constitutes nothing short of malpractice.

H. F. Gleason, M.D.

Malden, Mass.

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OBITUARY.

DR. ADELBERT J. VOLCK.

Died, at his home, 1601 Linden ave., Baltimore, Md., in the eighty-fourth year of his age, Adelbert J. Volck, D.D.S.

Dr. Volck was a native of Augsburg, Bavaria, and received his early education in Nuremburg.

He came to America in 1848 and went to St. Louis, where his brother-in-law, a Lutheran minister, had an established church. A year later Dr. Volck went to California with the argonauts of '49 in quest of gold, which, however, he abandoned, returning to Baltimore about two years later. He entered the office of Dr. Chapin A. Harris in that city, and later entered the Baltimore College of Dental Surgery, from which institution he was graduated in 1852 with the degree of D.D.S. At the time of his death he was one of the oldest living graduates of that institution.

Dr. Volck pursued the practice of dentistry in Baltimore from the time of his graduation until a little more than a decade ago, when, owing to an injury resulting from a fall, he decided to relinquish his dental practice and devote himself exclusively to art work, an interest which had occupied most of his leisure time.

Dr. Volck's strong artistic tendencies manifested themselves in his professional work. He soon attained great skill and a wide reputation for his abilities in the carving of artificial tooth forms, using a porcelain composition based on his own formula. He was a skilled and artistic operator, and one of the earliest to practically produce the porcelain inlay. In the *American Journal of Dental Science* for July 1859, page 322, Dr. Volck describes a method of introducing porcelain fillings which was perhaps the first method used for the introduction of inlays in the treatment of dental caries. The suggestion which was the basis of his technique he credits to the late Dr. Edward Maynard. The method consisted of grinding a selected piece of porcelain to approximately fit the cavity, temporarily fastening it in place with cement, then cutting out the cement line and filling the groove thus formed with gold foil, the whole then being ground flush with the surface of the tooth and polished. The method was of course applicable to only labial and buccal surfaces, but produced a most artistic result, which was a decided improvement upon any other method of filling special cavities of this class in conspicuous positions. The writer hereof witnessed the insertion of such a filling in the labial surface of a central incisor of the late W. D. Miller by the late Prof. Charles J. Essig when Dr. Miller was a student in the University of Pennsylvania in 1879.

The versatility of Dr. Volck in his art work was his most remarkable characteristic. He possessed marked abilities as a painter, was a skilful draftsman in crayon; he also produced many notable works of sculpture and innumerable artistic pieces of wood carving. He was expert in all of the technical detail of the several art processes that engaged his attention. His statuettes and reliefs he made throughout with his own hands from the modeling to the final casting and finishing. In the artistic treatment of metal surfaces he did remarkable work and was an expert in metal *repoussé* work. Dr. Volck possessed that precision of thought and executive skill and that faithfulness to the ideal of nature's standards which are the essential characteristics of the true artist. His fund of information was extensive, and his clear knowledge of the data within the scope of his activities made his opinions as an art critic desirable, and caused them to be much sought for. He was a delightful and interesting companion.

Dr. Volck was maried in 1852 to Miss Letitia Roberta Alleyn of Baltimore, who died ten years ago in the year of their golden wedding. He is survived by two daughters and one son.

The funeral services were held at his home, and the interment was at Loudon Park Cemetery, Baltimore.

SAMUEL EDWARD DAVIS.

DIED, at St. Luke's Hospital, New York city, on Friday, April 5, 1912. in his seventy-second year, Dr. SAMUEL EDWARD DAVIS.

Dr. Davis was born at Hardwick, Vt., October 28, 1841. He was educated at Danville, Vt., and in 1859 became associated with Dr. Forbush of Montpelier in the practice of dentistry. On September 8, 1862, he enrolled as a private in Company B, 15th Regiment Vermont Volunteers, in the service of the United States in the civil war, and was honorably discharged at Brattleboro, Vt., August 5, 1863. In 1866 he entered as a student the office of E. J. Dunning, of 11 Waverly Place, New York city, with whom he remained associated for about seven years. Subsequently, Dr. Davis' offices were at 4 West 33d st., 31 West 32d st., and 13 East 33d st., New York. His *clientèle* for many years was very large, and included many of the distinguished New York families.

Though not a graduate of a dental college, Dr. Davis' professional training had been of the severe type belonging to the early gold-filling period, and his methods of practice were carried out with great thoroughness and consistency. He was particularly a master in the manipulation of Abbey's "soft" foil, and few men could equal his standard, as to solidity and finish, in the use of that gold. He was a consistent believer in the filed separation between teeth where decay had taken place. Such surfaces were boldly formed, the fillings made flat, and the whole highly polished. He preferred the use of napkins to the rubber dam in maintaining mouth dryness, and the hand excavator to the engine, yet his operations were performed with certainty and celerity. He was vigorous and even severe in his work, seldom sparing the patient or himself where a difficult case presented.

Dr. Davis was below the average in height and weight, but broad-shouldered and of wiry build. His personality was a genial one, with all the strength and consistency that comes with undoubted convictions. He was unmarried. He was for many years a member of the Union League Club of New York. He spent his vacations in travel, preferring Switzerland to all other countries. Dr. Davis had retired from practice about four years ago.

W. B. D.

DR. W. H. WILLIAMSON.

Died, in Aberdeen, Scotland, April 13, 1912, in his fifty-ninth year, Wm. Herbert Williamson, D.D.S., L.D.S., M.D.

Dr. Williamson, who occupied a leading place in his profession for many years, was born in Leicester, but spent practically all his life in Aberdeen, where his father, the late William Williamson, was in practice as a dental surgeon. The deceased received his early education at the grammar school, Aberdeen, and was afterward a student of Aberdeen University, where he received the degree of M.B. with highest honors in 1874, and that of M.D. in 1880. Continuing his studies in Edinburgh, he became L.D.S. in 1881, and going to America studied in the Philadelphia Dental College, where the degree of D.D.S. was conferred upon him. Returning to Aberdeen in 1882, he became associated with his father in his profession, and on the latter's death he took up practice on his own account. In his practice he attained much eminence, and for many years was dental surgeon for the Aberdeen Royal Infirmary. In 1904–05 he was president of the British Dental Association.

He was of an exceedingly kindly and genial disposition, and upright and honorable in every relation of life. He was a member of St. Paul's Episcopal Church, and for many years regularly read the lessons in that church. He was very warmly interested in art, and was a leading member of the Aberdeen Artists' Society, taking an esteemed part in all its operations, particularly in connection with the various exhibitions held in the art gallery. Dr. Williamson himself painted with considerable skill, and his knowledge of the best art in the country was singularly full and accurate. He had traveled extensively and had visited all the leading foreign and continental galleries. He was a man of cultured taste, and widely read in the best literature.

Dr. Williamson, who was fifty-nine years of age, was predeceased by his wife several years ago, and is survived by two daughters and three sons, Douglas Williamson, L.D.S. (Eng.), Dr. Maurice J. Williamson of the Royal Army Medical Staff Corps, and Wm. Williamson of Australia.

Brief Necrology.

Dr. Granville C. Sandusky of Shelbyville, Tenn., on March 28, 1912.

Dr. A. L. McKean of New Brighton, Staten Island, N. J., on March 6, 1912.

Dr. F. W. Van Sant of Oakland City, Ind., on March 30, 1912, in his thirty-third year.

Dr. Charles E. King of Bristol, Pa., on March 9, 1912, after prolonged illness. Deceased was a graduate of the Philadelphia Dental College.

Dr. Rutledge R. Copeland of Baltimore, Md., on April 7, 1912, of anemia, in his thirty-eighth year. Deceased was a graduate of the Baltimore College of Dental Surgery.

Dr. Jennie F. Spurrier of Springfield, Ill., on March 4, 1912, in her seventieth year. Deceased was one of the first women licensed in the United States for the practice of dentistry.

Dr. WILLIAM E. HOAG of New York, N. Y., on April 4, 1912, from arterio-sclerosis, in his seventy-first year. Deceased was a graduate of the New York College of Dentistry and the College of Physicians and Surgeons.

Dr. JOHN R. LOWE of Newton, Kans., on April 16, 1912, of pneumonia. Deceased was a graduate of the Indiana Dental College of Indianapolis, and at one time president of the Southwestern Kansas Dental Association.

Dr. JOHN BACON COOLIDGE of Natick, Mass., on February 4, 1912, in his ninety-second year. Deceased was a veteran of the civil war, one of the founders of the Boston Dental College, secretary and professor of chemical dentistry and dental mechanics of that institution for a great many years, and a prolific inventor of dental appliances.

Dr. THOMAS C. PHILLIPS of Buffalo, N. Y., on March 31, 1912, in his thirty-seventh year. Deceased was a graduate of the Dental Department of the University of Buffalo, member of the Carr Dental Club, president of the Alumni Association of the Dental Department of the University of Buffalo, and late president of the Eighth District (N. Y.) Dental Society.

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SOCIETY NOTES AND ANNOUNCEMENTS.

DENTAL SOCIETY MEETINGS:

June and July.

JUNE.

ALABAMA DENTAL ASSOCIATION. Tuscaloosa. Four days: June 11th to 14th.

AMERICAN MEDICAL ASSOCIATION, SECTION ON STOMATOLOGY. Atlantic City. Four days: June 4th to 7th.

ARKANSAS STATE DENTAL ASSOCIATION. Little Rock. Three days: June 19th to 21st.

CANADIAN DENTAL SOCIETY AND ONTARIO DENTAL ASSOCIATION. Hamilton, Ont. Four days: June 3d to 6th.

COLORADO STATE DENTAL ASSOCIATION. Colorado Springs. Three days: June 20th to 22d.

GEORGIA STATE DENTAL SOCIETY. Americus. Three days: June 11th to 13th.

MAINE DENTAL SOCIETY. Bar Harbor. Three days: June 26th to 28th.

MARYLAND STATE DENTAL ASSOCIATION. Baltimore. Two days: June 14th and 15th.

MINNESOTA STATE DENTAL ASSOCIATION. St. Paul. Two days: June 14th and 15th.

MISSISSIPPI DENTAL ASSOCIATION. Gulfport. Three days: June 4th to 6th.

NEW HAMPSHIRE DENTAL SOCIETY. Weirs. Three days: June 19th to 21st

NORTHERN OHIO DENTAL ASSOCIATION. Cedar Point. Three days: June 11th to 13th.

PENNSYLVANIA STATE DENTAL SOCIETY. Pittsburgh. Three days: June 11th to 13th.

SOUTH CAROLINA STATE DENTAL ASSOCIATION. Charleston. Three days: June 18th to 20th.

SOUTHERN WISCONSIN DENTAL ASSOCIATION. Delavan. Two days: June 6th and 7th.

TENNESSEE STATE DENTAL ASSOCIATION. Memphis. Three days: June 6th to 8th.

TRI-SOCIETY (N. J.) EXHIBITION AND CONVENTION. Atlantic City. Three days: June 19th to 21st.

UTAH STATE DENTAL SOCIETY. Ogden. Two days: June 3d and 4th.

JULY.

AMERICAN SOCIETY OF ORTHODONTISTS. Chicago, Ill. Three days: July 1st to 3d.

NORTH CAROLINA STATE DENTAL SOCIETY. Raleigh. Four days: July 3d to 6th.

NOVA SCOTIA DENTAL ASSOCIATION. Halifax. Two days: July 11th and 12th.

VIRGINIA STATE DENTAL ASSOCIATION. Old Point Comfort. Three days: July 9th to 11th.

Examiners' Meetings.

ALABAMA BOARD OF EXAMINERS. Tuscaloosa. June 10th.

ARKANSAS BOARD OF EXAMINERS. Little Rock. June 17th and 18th.

CONNECTICUT DENTAL COMMISSIONERS. Hartford. June 27th to 29th.

IDAHO BOARD OF EXAMINERS. Boise. July 1st.

ILLINOIS BOARD OF EXAMINERS. Chicago. June 13th.

INDIANA BOARD OF EXAMINERS. Indianapolis. June 10th to 15th.

IOWA BOARD OF EXAMINERS. Iowa City. June 3d.

MAINE BOARD OF EXAMINERS. Augusta. June 20th to 22d.

MASSACHUSETTS BOARD OF REGISTRATION. Boston. June 5th to 7th.

MICHIGAN BOARD OF EXAMINERS. Ann Arbor. June 17th to 22d.

MISSISSIPPI BOARD OF EXAMINERS. Jackson. June 18th.

MONTANA BOARD OF EXAMINERS. Helena. July 8th to 11th.

NEW JERSEY BOARD OF REGISTRATION. Trenton. June 24th to 26th.

NORTH CAROLINA BOARD OF EXAMINERS. Raleigh. July 1st.

NORTH DAKOTA BOARD OF EXAMINERS. Fargo. July 9th to 11th.

PENNSYLVANIA BOARD OF EXAMINERS. Philadelphia and Pittsburgh. June 19th to 22d.

RHODE ISLAND BOARD OF REGISTRATION. Providence. June 25th to 27th.

SOUTH CAROLINA BOARD OF EXAMINERS. Columbia. June 25th.

SOUTH DAKOTA BOARD OF EXAMINERS. Sioux Falls. July 9th.

TEXAS BOARD OF EXAMINERS. Houston. June 10th.

VERMONT BOARD OF EXAMINERS. Montpelier. July 1st to 3d.

VIRGINIA BOARD OF EXAMINERS. Richmond. June 11th.

WEST VIRGINIA BOARD OF EXAMINERS. Wheeling. June 12th to 14th.

WISCONSIN BOARD OF EXAMINERS. Milwaukee. June 24th.

WYOMING BOARD OF EXAMINERS. Cheyenne. July 1st to 3d.

INTERNATIONAL CONGRESS ON HYGIENE AND DEMOGRAPHY,

Washington, D. C., September 23d to 28th.

TO THE MEMBERS OF THE DENTAL PROFESSION OF THE UNITED STATES OF AMERICA:

The fifteenth International Congress on Hygiene and Demography is to be held in Washington, D. C., September 23–28, 1912, under the auspices of the United States government.

This organization is the highest authority in matters of hygiene in existence to-day, and this is the most important meeting of the kind held in this country in its history; and the United States government is acting as host to the fifteen nations that have so far signified their intention of participating in the coming congress. Through the courtesy of the United States government the dental profession of this country has received an invitation to contribute to its success. This is the first time that the dental profession of this country has received such recognition by the home government. Place has been made for representation of the dental profession both upon the literary program and among the exhibitors.

The opportunity for which we have been seeking—that is, the opportunity to show the important relation the human mouth bears to the health, strength, and welfare of mankind—is now before us. The influence of this congress is world-wide in its scope and it will be visited by many thousands of people who are interested in hygiene and the general welfare of mankind. If American Dentistry is to maintain its reputation throughout the world, it behooves the members of the profession of this country to unite in a general effort to have the largest, finest, and most instructive dental exhibit in the history of dentistry assembled on this occasion, and at the request of the Oral Hygiene Committee N. D. A., Dr. J. W. Schereschewsky, U.S.P.H. and M.H.S., director of the exhibition, has set aside 1000 sq. ft. of floor and 500 sq. ft. of wall space in the building which is being erected for the exhibits, to be devoted to the use of the dental profession for exhibit purposes. At the meeting of the committee held in Cleveland March 23, 1912, a resolution was passed inviting the oral hygiene committees of all state and local organizations to co-operate with it in making a success of this exhibit. Space will be assigned in such a manner that each state, city, and town will receive full credit for contributions in this direction.

The committee earnestly requests that every member of the profession who is interested in mouth hygiene and in the welfare of the dental profession become actively interested in a campaign to make a success of this exhibit. The oral hygiene committees of the state dental societies should endeavor to place themselves in touch with local organizations in their states in an endeavor to secure aid in the way of material suitable for exhibits and money to defray the expenses of such an exhibit as this should be. The committee would ask that each state and local organization make appropriations to meet the expense of collecting, mounting, and displaying such material as would make a creditable exhibit.

The committee requests that the oral hygiene committees that can or will take part in this exhibit communicate at the earliest possible moment with Dr. W. G. Ebersole, chairman of the Oral Hygiene Committee N. D. A., 800 Schofield Bldg., Cleveland, Ohio; for local information, Dr. W. Smith Frankland, The Burlington, Washington, D. C., assistant secretary-treasurer of the National Mouth Hygiene Association for the district of Columbia.

The Oral Hygiene Committee N. D. A. instructed its secretary, Dr. Waldo E. Boardman of Boston, Mass., to communicate with Dr. Wm. H. Potter of Boston, Mass., with a view of obtaining some ideas derived from the dental exhibit shown at the International Hygiene Exhibition in Dresden, May to October, 1911. Dr. Potter's response is given herewith with a view of giving some idea of how to build or prepare an exhibit of this kind:

BOSTON, April 13, 1912.

Dear Dr. Boardman,—In regard to the dental exhibit at the International Hygiene Exhibition in Dresden, May to October 1911, I am obliged to rely on my memory, inasmuch as I was unable to find a catalog of this portion of the department. There were in the exhibit as follows:

(1) Large numbers of anatomical specimens. Skulls; parts of skulls with teeth in place. In this respect it was similar to the exhibition in connection with the Fifth International Dental Congress, Berlin, 1909.

(2) Orthodontia cases represented by models. Regulating apparatus.

(3) Teeth representing the progress of decay from the initial softening to the large destructive cavity.

(4) Charts showing the percentage of dental decay among people of various occupations and living under various conditions.

(5) Charts showing the influence of food and water (hard or soft) upon the percentage of dental decay.

(6) Charts giving rules for the prevention of decay.

(7) School dental clinics. A description of the most important ones of Europe, with literature giving statistics and methods of work.

(8) The analysis of saliva. Charts showing the method employed.

These are a few of the features. There were many more which I wish I could remember.

Very truly yours,
WM. H. POTTER.

Let every member of the profession who is interested write offering to do his part. Do not wait for us to write to you, for we have much to do if we undertake to make a success of this work.

At the same meeting the Oral Hygiene Committee passed a resolution inviting the dental colleges of this country to contribute to the success of the dental exhibit; and the secretaries or deans of the various colleges are requested to communicate either with Dr. W. G. Ebersole or Dr. W. Smith Frankland indicating what aid they will give in connection with the coming exhibit. It will be so arranged that each college will be assigned space for its own exhibit. Come to our aid and give us your hearty support in this work.

Appealing to every member of the profession to become actively interested in this exhibit in the interest of the dental profession as a whole, we are

Respectfully yours,
W. G. EBERSOLE,
B. HOLLY SMITH,
WALDO E. BOARDMAN,
J. V. CONZETT,
S. W. FOSTER,
Oral Hygiene Committee N. D. A.

AMERICAN MEDICAL ASSOCIATION.

Section on Stomatology.

Following is the program of the Section on Stomatology for the meeting of the American Medical Association at Atlantic City, June 4–7, 1912:

1. "Oral Surgery and Its Relationship to General Medicine." (Chairman's Address.) S. L. McCurdy, Pittsburgh, Pa.
2. "The History, Object, and Success of the Oral Hygiene Movement." Richard Grady, Annapolis, Md.
3. "Wanted: A Sense of Asepsis." John S. Marshall, Berkeley, Cal.
4. "Mouth Cleanliness." M. H. Fletcher, Cincinnati, Ohio.
5. "Some Hygienic Errors of Dentists." L. G. Noel, Nashville, Tenn.
6. "The Care of the Mouths of the Sick." W. C. Fisher, New York, N. Y.
7. "Extra-Oral Bilateral Resection of the Mandible, Posterior to the Second Molar, for the Correction of Prognathism." W. Harsha, Chicago, Ill., and Jos. Eisenstaedt, Chicago, Ill.
8. "Acute Osteomyelitis of the Lower Jaw." W. Wayne Babcock, Philadelphia, Pa.
9. "Blind Abscesses." M. L. Rhein, New York, N. Y.
10. "Infections of the Upper and Lower Jaw." Fred. V. Hussey, Providence, R. I.
11. "The Hospital's Need of a Dental Staff." Andrew J. Flanagan, Springfield, Mass.
12. "The Cubical Contents and Superficial Area of the Maxillary Sinuses." Virgil Loeb, St. Louis, Mo.
13. "The Pathological Findings of Some Diseases of the Teeth and Gums." Vida A. Latham, Chicago, Ill.
14. "Saliva in Its Relation to the Hardening and Softening of Tooth Enamel." Joseph Head, Philadelphia, Pa.
15. "The Reciprocal Influences of Morbid Conditions of the Mouth, the Jaws, and the General Economy." M. I. Schamberg, New York, N. Y.
16. "The Speech Relation of Cleft Palate Operations." Geo. V. I. Brown, Milwaukee, Wis.
17. "Iodo-glycerol in the Treatment of Bone Infection." Eugene S. Talbot, Chicago, Ill.

All those interested in this program are cordially invited to attend and take part in the discussion.

Stewart L. McCurdy, *Chairman*,
Eugene S. Talbot, *Sec'y*.

NATIONAL DENTAL ASSOCIATION.

Manufacturers' Exhibit.

The manufacturers' exhibit during the convention of the National Dental Association in Washington, September 10 to 13, 1912, inclusive, will be held in the New Ebbitt Hotel, which is just across the street from the headquarters and the clinics. Specifications, plans, rates, and full information can be had by addressing

Clyde M. Gearhart, *Ch'man Exhibit Com.*,
1616 I st., N. W., Washington, D. C.

Notice from Clinic Committee.

The Clinic Committee desires to extend to all members in good standing of all dental societies a cordial invitation to attend and to clinic at the "all-day" clinic of this association, to be held at the New Willard Hotel, Washington, D. C., Friday, September 13th. The enormous ballroom, top floor of this hotel, has been secured, and the management promises us every convenience.

We call your attention to the classification of the clinical material. Every effort will be made to arrange the different events according to title and in sequence, so that the various steps in the operation may be seen at a glance, without the usual regard to chair or table. This will avoid confusion and save time, allowing the members to select and study favorite subjects without hunting all over the room.

From the material now in hand the committee can promise a large and varied clinic. In order that we may assemble all clinicians' names and titles for the preliminary program, kindly reply at once to the chairman.

COMMITTEE.

C. J. Grieves, *Chairman*, Park ave. and Madison st., Baltimore, Md.

A. O. Ross, *Vice-chairman*, 807 N. High st., Columbus, Ohio.

S. W. Bowles, *Secretary*, 1616 I st., Washington, D. C.
W. R. Clack, Mason City, Iowa.
A. P. Burkhart, Auburn, N. Y.
J. T. McClenahan, Washington, D. C.
W. D. Tracy, New York, N. Y.
George E. Savage, Worcester, Mass.
John H. McClure, Wheeling, W. Va.
J. E. Chace, Ocala, Fla.
E. L. Pettibone, Cleveland, Ohio.
H. J. Allen, Washington, D. C.
W. R. Wright, Jackson, Miss.
C. A. Lundy, Los Angeles, Cal.
S. H. McAfee, New Orleans, La.
C. M. Barnwell, Atlanta, Ga.
Richard L. Simpson, Richmond, Va.
W. H. Scherer, Houston, Texas.

AMERICAN SOCIETY OF ORTHODONTISTS.

The twelfth annual meeting of the American Society of Orthodontists will be held in Chicago, Ill., Monday, Tuesday, and Wednesday, July 1, 2, and 3, 1912.

Frederick C. Kemple, *Sec'y*,
576 Fifth ave., New York, N. Y.

CANADIAN DENTAL SOCIETY AND ONTARIO DENTAL ASSOCIATION.

Union Meeting.

A union meeting of the Canadian Dental Society and Ontario Dental Association will be held at Hotel Brant, Hamilton, Ont., June 3, 4, 5, and 6, 1912.

J. A. C. Hoggan.

NOVA SCOTIA DENTAL ASSOCIATION.

The annual meeting of the Nova Scotia Dental Association will be held in Dalhousie University building, Halifax, Thursday and Friday, July 11 and 12, 1912. The equipment of the dental department affords every facility for clinical demonstrations. A good program is being arranged.

Mark the dates off your appointment book now.

Wm. W. Woodbury, *Sec'y*.

UTAH STATE DENTAL SOCIETY.

The twenty-first annual meeting of the Utah State Dental Society will be held at Ogden, Utah, June 3 and 4, 1912.

W. G. Dalrymple, *Sec'y*.

NEW HAMPSHIRE DENTAL SOCIETY.

The annual meeting of the New Hampshire Dental Society will be held at Hotel Weirs, Weirs, N. H., June 19, 20, and 21, 1912. All ethical members of the profession are cordially invited to be present.

Fred F. Fisher, *Sec'y*,
Manchester, N. H.

SOUTHERN WISCONSIN DENTAL ASSOCIATION.

The eighteenth annual meeting of the Southern Wisconsin Dental Association will be held at Highland Park, Delavan, Lake Delavan, Wis., June 6 and 7, 1912. All ethical members of the profession are cordially invited to attend.

C. W. Collver, *Sec'y*.

MARYLAND STATE DENTAL ASSOCIATION.

The next meeting of the Maryland State Dental Association will be held in Baltimore, at Odd Fellows Temple, Friday and Saturday, June 14 and 15, 1912. The meeting will be called to order promptly at 10 a.m. on Friday, June 14th.

A cordial invitation is hereby given to all regular practitioners of dentistry to attend and take part in the meeting.

F. F. Drew, *Corresp. Sec'y*.

ARKANSAS STATE DENTAL ASSOCIATION.

The next meeting of the Arkansas State Dental Association will be held in Little Rock, Ark., June 19, 20, and 21, 1912.

Every effort will be made to make it more interesting, more instructive, and more entertaining than ever before; each individual, by his support, can materially assist in this desired result.

Irvin N. Sternberg, *Sec'y*,
Fort Smith, Ark.

TRI-SOCIETY (N. J.) EXHIBITION AND CONVENTION.

A TRI-SOCIETY (N. J.) dental exhibition and convention will be held in Atlantic City, N. J., June 19 to 21, 1912. The three societies entering into the arrangement are the Southern Dental, the Mercer, and the Atlantic County. The official designation is—"Second Annual Convention under the auspices of the Southern, Mercer, and Atlantic Dental Societies."

Notwithstanding the fact that Young's Old Pier, Atlantic City, on March 29th, was damaged to an extent entailing $200,000 loss, the above-named societies will hold their convention and exhibit in Atlantic City as arranged. It was announced in March that both the convention and exhibit would be held at the Old Pier, but it having just been ascertained that contemplated repairs cannot be made by June 19th, the Executive Committee have contracted for the use of the famous Steel Pier located at Virginia ave. and the Boardwalk, hence all notices, arrangements and contracts relating to the convention and exhibit are being made to conform to the new location.

A preliminary committee, appointed by the Mercer Society, consisted of Drs. John E. Woolverton, John C. Forsyth, and E. H. Ginnelley; another, from the Southern Dental Society, of Drs. J. E. Duffield, Cromwell Ironsides, and Wm. H. Gelston; from the Atlantic County Society, of Drs. B. B. Filer, M. P. Shoemaker, and J. F. Crandall. These gentlemen held meetings in Trenton, Camden, and Atlantic City, and had power to draw upon the membership for committeemen to conduct the business of the exhibit and convention.

At a meeting held in Camden, February 21st, the president of the Atlantic County Society, Dr. A. L. Westcott, was elected chairman of an Executive Committee, and the president of the Southern Dental Society, Dr. Stanley Ironsides of Camden, and Dr. W. G. Chase of Princeton, president of the Mercer Society, vice-chairmen. Dr. W. H. Gelston of Camden was elected secretary and Dr. John J. Blackman of Atlantic City, treasurer. To these are now added the subcommittee chairmen and Drs. John E. Woolverton, John C. Forsyth, and Cromwell Ironsides, of the preliminary committees.

At a meeting of the Executive Committee held in Camden, Wednesday, February 28, 1912, a thorough outline of the work of the convention was prepared, including the appointment of all committees.

Essay Committee—J. E. Duffield, chairman, Camden; C. H. Dilts, Trenton; John E. Woolverton, Trenton; A. K. Wood, Camden; C. C. Raith, Atlantic City; Mary Morrison, Salem; Sarah Jackson, Vineland.

Exhibit Committee—M. P. Shoemaker, chairman, Atlantic City; S. J. Callahan, Woodstown; A. L. Westcott, Atlantic City; W. G. Chase, Trenton; H. H. Baker, Atlantic City; F. J. Crandall, Atlantic City; James I. Woolverton, Trenton; C. Ironsides, Camden; B. B. Filer, Atlantic City.

Clinic Committee—W. H. Gelston, chairman, Camden; J. C. Forsyth, Trenton; G. P. Tuttle, Camden; John E. Woolverton, Trenton; A. B. Dewees, Camden; A. R. Slade, Millville; B. G. Duplaine, Atlantic City; J. S. Owens, Camden.

Hotels and Entertainment Committee—B. B. Filer, chairman, Atlantic City; C. W. Raith, Atlantic City; T. J. McLernon, Camden; M. P. Shoemaker, Atlantic City; J. F. Crandall, Atlantic City; D. A. Mulford, Salem; B. G. Duplaine, Atlantic City; F. K. Hazleton, Trenton; E. H. Peplow, Trenton.

Program Committee—E. H. Ginnelley, chairman, Trenton; A. E. Boice, Trenton; J. F. Crandall, Atlantic City; S. Ironsides, Camden; W. C. Carmany, Atlantic City; G. W. Wilkens, Trenton.

Registration Committee and Bureau of Information—H. H. Baker, chairman, Atlantic City; S. T. Percival, Atlantic City; W. R. Cornell, Camden; Marcus Weintrob, Atlantic City; J. J. Lerner, Atlantic City; G. W. Wilkens, Trenton; A. Vickers, Camden.

Press and Advertising Committee—W. W. Crate, chairman, Camden; J. F. Crandall, Atlantic City; James I. Woolverton, Trenton; C. P. Tuttle, Camden; M. J. Waas, Camden; W. C. Carmany, Atlantic City.

Electrical Committee—A. B. Dewees, chairman, Camden; M. P. Shoemaker, Atlantic City; W. H. Gelston, Camden; J. F. Crandall, Atlantic City.

Papers will be read on Thursday, June 20th, at 10 A.M., Friday, June 21st, at 10 A.M., and on Thursday, June 20th, at 8 P.M.

Clinics will be held on Thursday, June 20th, from 2 to 5 P.M.

Dr. H. E. Friesell of Pittsburgh, Pa., Professor of Operative Dentistry, University of Western Pennsylvania, will read a paper on the subject of "Extension for Prevention;" Dr. C. S. Van Horn of Bloomsburg, Pa., will read a paper upon the subject, "The Wax Pattern"—a technique, together with appliance, etc., for its use. Two other papers which are being arranged for will be announced later.

The convention held at Young's Pier in 1911, by the Southern Dental and Atlantic County Societies, proved successful, and with the assistance of the Mercer Society the convention this year should prove to be an even greater success.

WALTER W. CRATE,
Ch'man Press Committee.

MAINE DENTAL SOCIETY.

THE forty-seventh annual meeting of the Maine Dental Society will be held at the Newport House, Bar Harbor, Me., June 26, 27, and 28, 1912.

I. E. PENDLETON, *Sec'y.*

MISSISSIPPI DENTAL ASSOCIATION.

THE thirty-seventh annual meeting of the Mississippi Dental Association will be held at Gulfport, Miss., June 4, 5, and 6, 1912. All ethical practitioners are cordially invited to attend and take part in the meeting. Dr. A. J. Price of Gulfport will have charge of the clinics, and will furnish any information as to same.

L. B. PRICE, *Sec'y,*
Corinth, Miss.

TENNESSEE STATE DENTAL ASSOCIATION.

THE forty-fifth annual meeting of the Tennessee State Dental Association will be held at Memphis, Tenn., in the Business Men's Club rooms, June 6, 7, and 8, 1912.

The Business Men's Club extends the courtesies of the club to all the visiting dentists, and the association invites all ethical dentists to attend.

CHAS. A. TAVEL, *Pres.,*
J. L. MANIRE, *Sec'y.*

PENNSYLVANIA STATE DENTAL SOCIETY.

THE forty-fourth annual meeting of the Pennsylvania State Dental Society will be held in Carnegie Music Hall, Pittsburgh, June 11, 12, and 13, 1912. A program of exceptional interest is being prepared.

LUTHER M. WEAVER, *Recording Sec'y.*

ALABAMA DENTAL ASSOCIATION.

THE forty-third annual meeting of the Alabama Dental Association will be held in Tuscaloosa, Ala., June 11, 12, 13, and 14, 1912. Instructive papers have been secured, and the Clinic Committee will unquestionably present a fine list of clinics.

A cordial invitation is extended to all ethical dentists.

G. F. PETREY, *Sec'y,*
Florala, Ala.

SOUTH CAROLINA STATE DENTAL ASSOCIATION.

THE forty-second annual meeting of the South Carolina State Dental Association will be held at the Isle of Palms, Charleston, S. C., June 18, 19, and 20, 1912.

Dr. R. Atmar Smith, Charleston, S. C., is chairman of the Arrangements Committee. Programs will be mailed on June 10th. All ethical dentists are cordially invited.

W. BUSEY SIMMONS, *Recording Sec'y,*
Piedmont, S. C.

COLORADO STATE DENTAL ASSOCIATION.

THE twenty-sixth annual meeting of the Colorado State Dental Association will be held at Colorado Springs, June 20, 21, and 22, 1912. Dr. A. W. Starbuck, Colorado College of Dental Surgery, Denver, Colo., will have complete charge of clinics; he will gladly furnish any information relative to the same. Exhibitors desiring space will please address the secretary.

All ethical practitioners are cordially invited to attend this meeting. Any information desired will be cheerfully furnished.

H. F. HOFFMAN, *President,*
324 Metropolitan Bldg., Denver, Colo.
CHAS. A. MONROE, *Sec'y,*
Boulder, Colo.

GEORGIA STATE DENTAL SOCIETY.

The forty-fourth annual meeting of the Georgia State Dental Society will be held at Americus, Ga., June 11, 12, and 13, 1912.

Instructive papers have been secured and the Clinic Committee will unquestionably present a fine list of clinics. A cordial invitation is extended to all ethical dentists.

M. M. Forbes, *Sec'y,*
810-11 Candler Building, Atlanta, Ga.

CHICAGO COLLEGE OF DENTAL SURGERY.

Alumni Association.

The annual meeting and clinic of the Alumni Association of the Chicago College of Dental Surgery will be held in the College building, on Monday and Tuesday, June 3 and 4, 1912. This meeting is to be a home-coming for all the graduates of the college, as well as for all ethical practitioners. Mark the dates now on your appointment book and plan to come.

H. C. Peisch, *Sec'y.*

NORTHERN OHIO DENTAL ASSOCIATION.

The Northern Ohio Dental Association will hold its next annual meeting at Cedar Point, June 11, 12, and 13, 1912.

An excellent program is assured. Not only the most prominent members of our own organization, but eminent clinicians from outside of the state, will be present and take part.

Cedar Point is the finest watering and convention resort on Lake Erie. It has fine hotels and restaurants, a big convention hall, and is reached by direct boat from Toledo, Cleveland, and Detroit; also by steam and electric via Sandusky. No more delightful place could be found to which to bring the ladies for a brief vacation.

C. D. Peck, *Sec'y,*
Sandusky, Ohio.

MINNESOTA STATE DENTAL ASSOCIATION.

The twenty-ninth annual meeting of the Minnesota State Dental Association, which will be held in St. Paul, Minn., June 14 and 15, 1912, promises to be the largest in the history of the organization. The large clinic and manufacturers' exhibit will occupy the entire top floor of the new Lowry Building, the largest and best equipped dental and medical building in the West.

At that time of the year the Twin Cities, with their wealth of parks and beautiful lakes, afford an ideal spot for a vacation, and the business and instruction of the meeting may well be combined with the recreation so necessary to our profession.

For information address

Benjamin Sandy, *Sec'y,*
636 Syndicate Bldg., Minneapolis, Minn.

VIRGINIA STATE DENTAL ASSOCIATION.

The Virginia State Dental Association will meet at Old Point Comfort, Va., July 9, 10, and 11, 1912. All ethical practitioners are invited.

W. H. Pearson, *Corresp. Sec'y.*

NORTH CAROLINA DENTAL SOCIETY.

The thirty-eighth annual meeting of the North Carolina Dental Society will be held at Raleigh, N. C., in the hall of the House of Representatives in the Capitol, July 3, 4, 5, and 6, 1912.

Instructive papers have been secured, and the Clinic Committee will unquestionably present a fine list of clinics. A cordial invitation is extended to all ethical dentists.

J. W. Stanly, *Sec'y,*
Wilmington, N. C.

WEST VIRGINIA STATE DENTAL SOCIETY.

The sixth annual meeting of the West Virginia State Dental Society will be held in the assembly-room of Webster Springs Hotel, Webster Springs, W. Va., August 14, 15, and 16, 1912; opening session at 2 o'clock on Wednesday the 14th.

The dentists of West Virginia, Virginia, Ohio, and Maryland are especially invited, and a cordial invitation is extended to all ethical members of the profession.

Frank L. Wright, *Sec'y,*
Wheeling, W. Va.

WEST BRANCH DENTAL FRATERNITY.

THIS organization was recently formed at Williamsport, Pa., to include in its membership all dentists within a distance of practically fifty miles on the east and west of Williamsport. The objects of the fraternity are to inculcate good-fellowship and fraternal spirit.

The officers for the ensuing year are: J. D. Coney, president; C. W. Williamson, vice-president; J. Roy Cherry, treasurer; C. H. Kast, secretary.

Dues $1.00 per year. The fraternity meets the last Tuesday in each month.

C. H. KAST, *Sec'y*,
Williamsport, Pa.

IOWA BOARD OF EXAMINERS.

THE next meeting of the Iowa State Board of Dental Examiners for the examination of applicants for licenses will be held at Iowa City, Iowa, commencing Monday, June 3, 1912.

J. A. WEST, *Sec'y*,
417 Utica Bldg., Des Moines, Ia.

PENNSYLVANIA BOARD OF EXAMINERS.

THE Pennsylvania State Board of Dental Examiners will hold their next regular examination in Philadelphia and Pittsburgh simultaneously on Wednesday, Thursday, Friday, and Saturday, June 19, 20, 21, and 22, 1912, the practical work being held on Wednesday. Application blanks can be secured from the Department of Public Instruction, Harrisburg.

ALEXANDER H. REYNOLDS, *Sec'y*,
4630 Chester ave., Philadelphia.

ALABAMA BOARD OF EXAMINERS.

THE Alabama Board of Dental Examiners will meet in annual session in Tuscaloosa, Ala., on Monday, June 10, 1912, at 9 A.M.

Applicants for license must hold a diploma from a reputable dental college, and pass a written examination in operative dentistry, prosthetic dentistry, including metallurgy and oral surgery, orthodontia, pathology, histology, materia medica, chemistry, anatomy, physiology, and oral hygiene. Practical work: One approximal gold and one amalgam filling, constructing an anterior bridge of six teeth, using canines as abutments, Richmond crowns—all soldering to be done in presence of one or more members of the board. Examination fee $10.00.

W. E. PROCTOR, *Sec'y*,
Sheffield, Ala.

TEXAS BOARD OF EXAMINERS.

THE next meeting of the Texas State Board of Dental Examiners, for the purpose of examining applicants for a license to practice dentistry and dental surgery in the state of Texas, will be held in Houston, Texas, beginning June 10, 1912, at 9 A.M.

For application blanks and any further information address

J. M. MURPHY, *Sec'y*,
Temple, Texas.

VIRGINIA BOARD OF EXAMINERS.

THE regular annual meeting of the Virginia State Board of Dental Examiners will be held in Richmond, Va., June 11, 1912, for the examination of applicants. Examinations will begin at 9 A.M.

For further information address

J. P. STIFF, *Sec'y*,
Fredericksburg, Va.

ILLINOIS BOARD OF EXAMINERS.

THE semi-annual meeting of the Illinois State Board of Dental Examiners for the examination of applicants for a license to practice dentistry in the state of Illinois will be held at the Northwestern University Dental School, corner Lake and Dearborn sts., Chicago, Ill., beginning Thursday, June 13, 1912, at 9 A.M.

Graduates of a reputable dental or medical school or college, or dental department of a reputable university, who enter the school or college as freshmen on or after the school year 1906–07, must have a minimum preliminary education of not less than graduation from an accredited high school.

Candidates will be furnished with proper blanks and such other information as is necessary, on application to the secretary. All applications, together with the fees, twenty-six dollars, must be filed with the secretary at least five days prior to date of examination. The examination fee is twenty dollars; license fee five dollars; registration fee one dollar.

Address all communications to

T. A. Broadbent, *Sec'y*,
705 Venetian Bldg., Chicago, Ill.

MAINE BOARD OF EXAMINERS.

The Maine Board of Dental Examiners will meet at the State-house, Augusta, Me., on June 20, 21, and 22, 1912, for the examination of candidates to practice dentistry in Maine. For application blanks and full particulars address

E. C. Bryant,
Pittsfield, Me.

SOUTH CAROLINA BOARD OF EXAMINERS.

The South Carolina Board of Dental Examiners will meet in the city of Columbia, Tuesday, June 25, 1912, at 11 A.M. All applicants must register with the secretary on that day.

For further information address

J. M. Quattlebaum, *Sec'y*,
Columbia, S. C.

MASSACHUSETTS BOARD OF REGISTRATION.

A meeting of the Massachusetts Board of Registration in Dentistry will be held in Boston, June 5, 6, and 7, 1912. For application blank and further information apply to

G. E. Mitchell, *Sec'y*,
14 Water st., Haverhill, Mass.

CONNECTICUT DENTAL COMMISSIONERS.

The Connecticut Board of Commissioners will meet on June 27, 28, and 29, 1912, at Hartford, Conn., to examine applicants for license to practice dentistry. Application blanks, rules, etc., will be forwarded by the recorder upon request.

D. Everett Taylor, *Recorder*,
Willimantic, Conn.

RHODE ISLAND BOARD OF REGISTRATION.

The Rhode Island Board of Registration in Dentistry will meet for the examination of candidates at the State-house, Providence, R. I., Tuesday, Wednesday, and Thursday, June 25, 26, and 27, 1912. Application blanks and particulars may be obtained from

H. L. Grant, *Sec'y*,
1025 Banigan Bldg., Providence, R. I.

NEW JERSEY BOARD OF REGISTRATION.

The New Jersey State Board of Registration and Examination in Dentistry will hold their semi-annual meeting in the Assembly Chamber of the State-house at Trenton, N. J., June 24, 25, and 26, 1912; practical work on the 24th.

Applications must be on hand one week prior to the examination.

Charles A. Meeker, *Sec'y*,
29 Fulton st., Newark, N. J.

INDIANA BOARD OF EXAMINERS.

The next regular meeting of the Indiana State Board of Dental Examiners will be held in the State-house, Indianapolis, Ind., June 10 to 15, 1912. All applicants for examination and registration will be examined at this time; no other examination will be held before January 1913. No temporary permits are issued.

For further information apply to

F. R. Henshaw, *Sec'y*,
508 K. of P. Bldg., Indianapolis, Ind.

WISCONSIN BOARD OF EXAMINERS.

The Wisconsin State Board of Dental Examiners will convene in Milwaukee, Wis., at Marquette University, on Monday, June 24, 1912, at 9 A.M., for examination of applicants to practice in Wisconsin.

High-school diploma, applications, and $25.00 fee must be filed with the secretary fifteen days prior to above date. Dental diploma to be presented in advance of examination.

W. T. Hardy, *Sec'y*,
422 Jefferson st., Milwaukee, Wis.

WEST VIRGINIA BOARD OF EXAMINERS.

THE West Virginia State Board of Dental Examiners will hold their regular examination, in Wheeling, W. Va., June 12, 13, and 14, 1912.

For information write

J. FLEETWOOD BUTTS, *Sec'y*,
Charleston, W. Va.

MICHIGAN BOARD OF EXAMINERS.

THE next regular meeting of the Michigan State Board of Dental Examiners will be held at the Dental College, Ann Arbor, Mich., commencing Monday, June 17, 1912, at 8 A.M., and continuing to the 22d inclusive.

For application blanks and full particulars address

F. E. SHARP, *Sec'y*,
Port Huron, Mich.

MISSISSIPPI BOARD OF EXAMINERS.

THE Mississippi State Board of Dental Examiners will meet at the State Capitol on the third Tuesday in June, and hold their annual examination. All applicants must be graduates of a reputable dental college or school of dental surgery.

REUEL MAY, *Sec'y*,
Jackson, Miss.

MONTANA BOARD OF EXAMINERS.

THE Montana State Board of Dental Examiners will meet in Helena, July 8, 9, 10, and 11, 1912, for the regular annual session. All desiring to take the examination will please send in their applications to the secretary, thirty days prior to July 8th.

G. A. CHEVIGNY, *Sec'y*,
106–108 Clark Blk., Butte, Mont.

WYOMING BOARD OF EXAMINERS.

THE Wyoming State Board of Examiners will meet to hold an examination for the examining of applicants at the State Capitol, Cheyenne, Wyo., July 1, 2, and 3, 1912. All applications must be complete, and in the hands of the secretary fifteen days prior to the time set by the board for examination to begin.

The written examination consists of anatomy, physiology, histology and bacteriology, chemistry and metallurgy, oral surgery, anesthetics, operative and prosthetic dentistry, materia medica and therapeutics, prophylactics, and orthodontia.

For further information and application blanks, address

PETER APPEL, Jr., *Sec'y*,
P. O. Box 643, Cheyenne, Wyo.

VERMONT BOARD OF EXAMINERS.

THE annual meeting of the Vermont State Board of Dental Examiners, for the examination of candidates for the practice of dentistry, will be held at the State-house, Montpelier, July 1, 2, and 3, 1912, commencing at 2 o'clock P.M., July 1st.

For application blanks and full particulars address

GEORGE F. CHENEY, *Sec'y*,
St. Johnsbury, Vt.

NORTH DAKOTA BOARD OF EXAMINERS.

THE next regular meeting of the North Dakota State Board of Dental Examiners will be held at Fargo, N. D., commencing Tuesday, July 9th, at 9 A.M., continuing through the 11th.

For application blanks and full particulars address

F. A. BRICKER, *Sec'y*,
Fargo, N. D.

SOUTH DAKOTA BOARD OF EXAMINERS.

THE South Dakota State Board of Dental Examiners will hold its next meeting at Sioux Falls, S. D., July 9, 1912, at 1.30 P.M., continuing three days. All applications for examination, together with a fee of twenty-five dollars, must be in the hands of the secretary by July 1st. Applicants who have not complied with the above will not be permitted to take the examination.

For further information, blanks, etc., address

ARIS L. REVELL, *Sec'y*,
Lead, S. D.

IDAHO BOARD OF EXAMINERS.

The next meeting of the Idaho State Dental Board for examinations will be held in Boise, Idaho, beginning July 1, 1912, at 9 A.M., at the Capitol building.

Albert A. Jessup, *Sec'y.*

NORTH CAROLINA BOARD OF EXAMINERS.

The next regular meeting of the North Carolina State Board of Dental Examiners will be held in Raleigh, N. C., July 1, 1912. For further necessary information address

F. L. Hunt, *Sec'y,*
Asheville, N. C.

ARMY DENTAL SURGEONS.

Memoranda of Changes in Stations and Duties.

For the week ending April 20, 1912:

First Lieut. F. P. Stone, April 11th, reports arrival at Fort Moultrie, S. C., for temporary duty.

For the week ending April 27th:

James F. Feely, C.D.S., April 22d, reports for temporary duty at Fort Myer, Va.

For the week ending May 4th:

First Lieut. F. Homer Wolven, April 26th, relieved from duty at Vancouver Barracks, Wash., and ordered to Fort McDowell, Cal., for duty.

First Lieut. R. E. Ingalls, April 26th, relieved from duty at Fort Douglas, Utah, and ordered to Vancouver Barracks, Wash., for duty.

First Lieut. John A. McAlister, Jr., April 29th, granted fifteen days' leave of absence about June 1st.

First Lieut. John H. Hess, April 26th, relieved from duty at Fort McDowell, Cal., and ordered to Fort Douglas, Utah, for duty.

For the week ending May 11th:

First Lieut. George L. Mason, May 2d, returned to Fort Snelling, Minn., from temporary duty at Fort Riley, Kans.

First Lieut. Frank P. Stone, May 8th, left temporary duty at Fort Moultrie, S. C., *en route* to Fort Screven, Ga., for temporary duty.

◆

UNITED STATES PATENTS

PERTAINING OR APPLICABLE TO DENTISTRY

ISSUED DURING APRIL 1912.

April 2.

No. 1,021,893, to Thomas W. Ross. Dental post extractor.

No. 1,022,055, to Marcelline Weiss. Articulator.

No. 1,022,070, to Steele F. Gilmore. Dental bridges and plates.

No. 1,022,139, to Joseph Horn. Tooth-brush.

No. 1,022,316, to Thomas S. Harlan. Dental waste receptacle.

April 9.

No. 1,022,838, to Levi L. Funk. Dental broach.

April 16.

No. 1,023,273, to Herbert A. Pullen. Dental regulator.

No. 1,023,641, to George T. Greer. Tooth-brush holder.

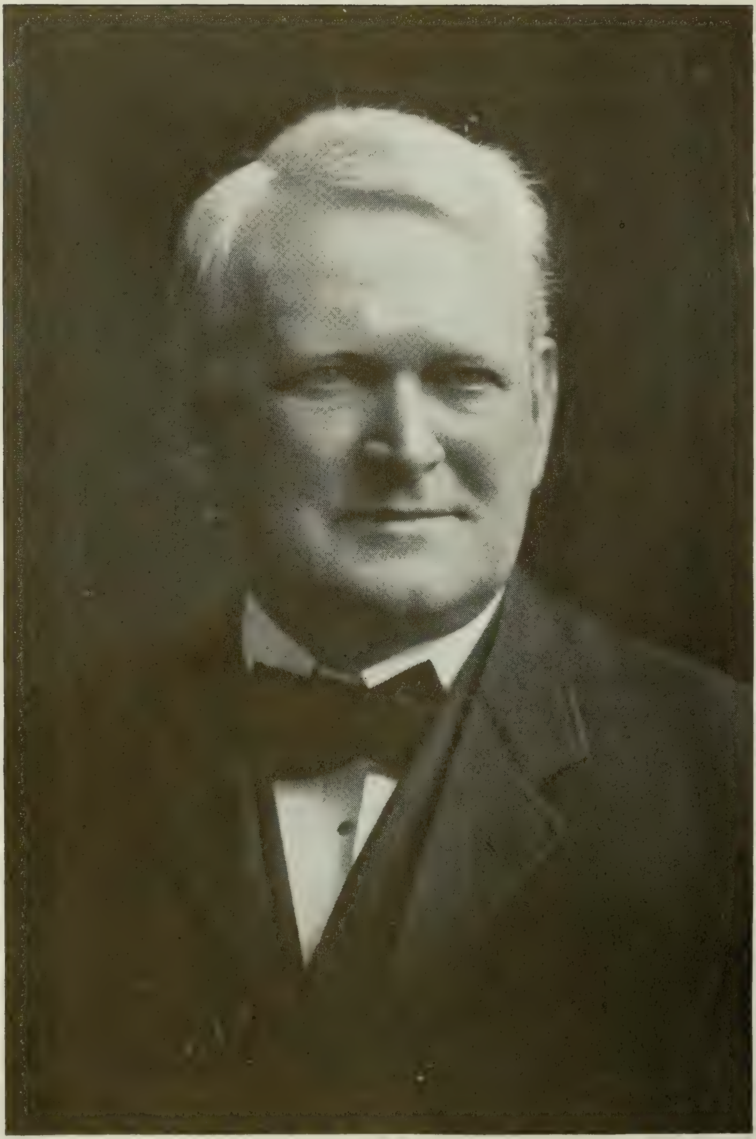
April 23.

No. 1,024,152, to Henry J. Smith. Method and means for producing dental plates.

No. 1,024,153, to Henry J. Smith. Dental plate.

April 30.

No. 1,024,556, to Graham Clarke. Attachment for anesthetizing machines.



DR. CHAS. H. BARTLETT.

THE

DENTAL COSMOS.

VOL. LIV. JULY 1912. No. 7.

ORIGINAL COMMUNICATIONS.

STEREOSCOPIC DENTAL SKIAGRAPHS (STEREOGRAPHS).

By C. EDMUND KELLS, Jr., D.D.S., New Orleans, La.

[Copyrighted, 1912.]

IN 1903 the writer laid before the members of the National Dental Association the (then) new art in dentistry—that of stereoscopic skiagraphy; but, greatly to his surprise and disappointment, the dental profession has never manifested any appreciable interest in this wonderful work, and up to this writing he has been unable to find anyone else who is doing practical work of this class.

Not only has stereoscopic work made no impression upon the dental profession, but even plain skiagraphs are undervalued and misinterpreted by some of our best-known authors. The fact should be emphasized that these plain skiagraphs are simple shadow pictures, and are therefore subject to all physical laws that govern ordinary silhouettes.

The lower teeth lend themselves most favorably to good results (referring still to *simple skiagraphs*) and under the best conditions apparently perfect pictures may be obtained from them. Here the film may be held against the inner vertical plane of the jaw, close to and almost if not perfectly parallel with the teeth. The tube may be so placed that the rays will fall at right angles to the long axes of the teeth and also to the flat surface of the film. As a result of this combination, shadow pictures are produced without distortion—illustrations of which have been so often published that a repetition here would be a sacrifice of valuable space.

When, however, pictures of the upper teeth are undertaken, certain difficulties are met with which cannot always be satisfactorily overcome. It is no longer possible to place the film parallel with the roots of the teeth, nor close to them, and consequently all pictures must be more or less distorted, and possibly some of them consequently misleading.

In multi-rooted teeth the shadows may conflict, or some of their shadows may not appear upon the film.

Probably the most distorted and therefore the most unsatisfactory pictures of all are those showing unerupted canines, for in such cases the films are usually held upon a curve which increases the distortion. Such a skiagraph merely shows the presence within the jaw of the tooth in question, and on account of the distortion probably gives no idea of its exact position and relation to adjacent teeth. Therefore when a leading textbook on orthodontia asserts that such pictures were expected to be precise, and on account of their not proving so condemns X-ray work in general as being unreliable, it is evident that such a writer merely shows his lack of knowledge of the subject.

The plain skiagraph having revealed the presence of the tooth in the jaw, a stereoscopic picture, or "stereograph," will bring to view its exact relations to the adjacent teeth. While possibly a passing glance may reveal to one's eye all there is to be seen in an ordinary skiagraph, it is useless to look at a stereograph unless one will take time to adjust the lenses with care and study the details *slowly*. In no other way can their wonderful beauties be brought out.

Possibly the lack of interest in stereoscopic work may be due to the fact that, notwithstanding a statement to the contrary in the *Items of Interest* of April 1911, no apparatus suitable for dental stereoscopic work can be purchased today in the market, and consequently any operator desiring to do this work must design and construct his own. It is not meant to say that it is absolutely impossible to take a stereograph with the films within the mouth with these machines, but that they are *not practical* for such work.

The ordinary stereoscopic machines used by surgeons and general Roentgen-ray operators, and which are supplied by various manufacturers, will suffice for taking such pictures of the skull with plates placed on the outside of the head, but such a method does not usually give satisfactory results in dental work. One has only to look at such examples of skiagraphs of the heads of *living subjects* as have been published from time to time in the dental journals to see that from a practical standpoint they are usually of absolutely no value. Usually the best results can be obtained only when pictures are taken with films within the mouth.

The tube-stand and the film-holders devised by the writer and used in doing the work shown in the before-mentioned paper of 1903, while answering their purposes, were not entirely satisfactory, and experience since then has suggested repeated changes in both. Experimental apparatus constructed by the writer or for his use is always very crude in appearance, it being realized that time spent in its finish is usually wasted—as frequently a piece is hardly well tried out before it goes into the junk pile, a later idea taking its place. So it is with no apology for its appearance that in Fig. 1 is shown the tube-holder now in use, its crudeness standing out in bold relief.

An old extension engine bracket, A, is secured to the wall, and this allows a wide range of horizontal and lateral motion. To this are attached B and C, taken from an old "K–K" stand, C having a great vertical range and also a swinging motion. At the lower end of the vertical member is attached a pivoted arm broken in its center by a ball-and-socket joint, D, carrying at its outer extremity a pivoted tube clamp, E, which is capable of being revolved through an entire circle. With this conglomerate aggregation, with its wide range of motion and many points of adjustment, the tube may be placed in any desired position and at any angle almost instantly.

Replacing the tube clamp E by the one shown in Fig. 2, it is now prepared for doing stereoscopic work with the films placed in the mouth, as at F there is a pivoted joint which allows of the swinging of the tube in an arc (*thus maintaining its focus*) while the stops H H limit this motion to the correct distance.

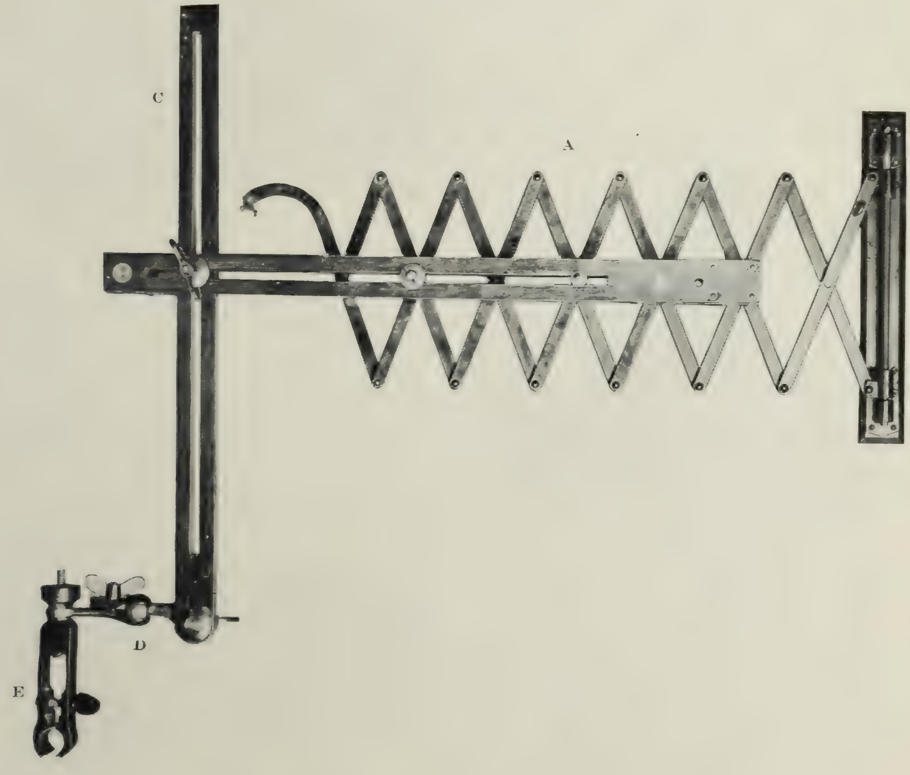
In all tube-holders so far seen, the motion used in changing the position of the tube as is necessary for stereoscopic work is a sliding one. The tube merely is slid along in a straight line the desired two and a half inches, and thus the object skiagraphed is not in the true focus of the tube. In swinging the tube in an arc as shown here, instead of sliding it along. the field to be depicted is practically maintained in focus. The advantages of such construction must be perfectly obvious. For plain work the bracket is sufficiently steady as it is, but for stereography after being placed in position it is firmly secured in place and all motion prevented by cords attached to the wall, it being in a corner.

While from the operator's standpoint it might be better to lay the patient on a table and secure the head immovably by suitable clamps, such a procedure might savor too much of the "electric chair" for most dental patients, so a milder process is used. The patient being comfortably seated in an ordinary chair with a photographer's head-rest to steady the head, the tube can be quickly adjusted so as to throw the rays at the desired angle.

The method of taking a stereograph is as follows: The tube is so placed as to squarely focus the rays on the field to be taken. It is then shifted 1¼ inch to one side and the first picture is taken. The film is quickly replaced by a fresh one, the tube shifted 2½ inches toward the other side, and a second picture is taken.

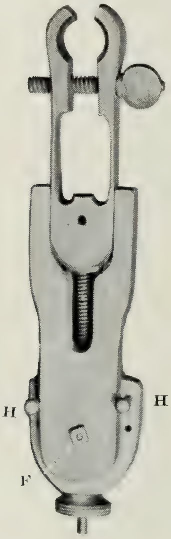
It must be noted that up to this writing it has always been taught that the second film must be placed in *exactly the same position* as the first or the result would not be satisfactory. While this is a very simple matter where plates are used external to the body, it must be admitted that the problem of an interchangeable film-holder to be operated within the mouth is a most difficult one to solve.

FIG. 1.



Dr. Caldwell of New York has made an apparatus for holding the films in the mouth and quickly changing them, about as follows: There are three brass receptacles for films—each two inches long by three-sixteenths of an inch thick, and respectively three-fourths, four-fourths, and five-fourths of an inch wide, and the upper surfaces of which are celluloid; these are capable of being fitted to the end of a brass tube, which is about twelve inches long. The film-holders of whichever of the above widths is best adapted to the case in hand are loaded into this holder, one of which is placed in the receptacle and under the celluloid window. The other is within the brass barrel and thus protected from the rays. The receptacle is placed in the mouth and the film therein exposed, when, by a very ingenious device operated by a string, the two films are quickly interchanged and the second exposure made.

Fig. 2.



From the nature of this instrument, its field of usefulness in the mouth is limited, but employed where it is adapted it produces the most beautiful results.

The writer's original film-holders were vulcanized rubber pockets with aluminum windows made upon a model for each case. These "pockets" were securely held in position by being thus fitted to the teeth, and the films, being exact duplicates, could be slipped in and out with the assurance that the second one would occupy the same place as the first. Other forms were also made, descriptions of which are hardly necessary. Later on it was discovered that the films need not be *exact duplicates in size,* nor need they occupy the same "spot"—all that was necessary being that they should occupy the same *plane.* This discovery simplified matters considerably, for now it was possible to dispense with the making of the troublesome and tedious pockets. Film-holders were then made by securing with modeling compound a piece of aluminum plate to the model upon the proper plane.

Fig. 3.

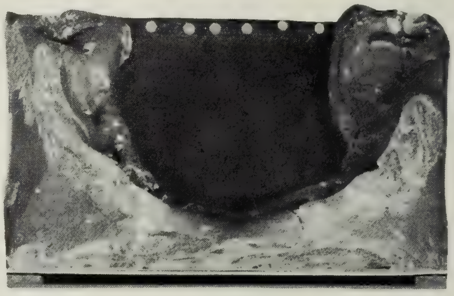
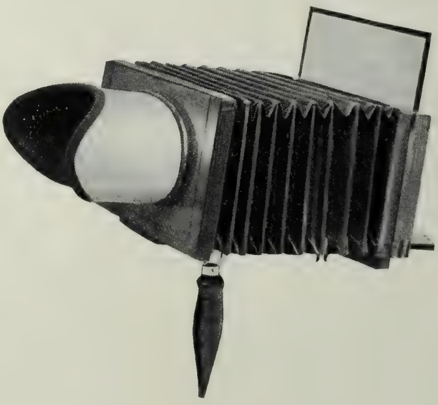


Fig. 6.



For the upper teeth it was naturally found advisable to make a plaster model of the case, and adjust the aluminum to it, but in all lower cases they could be readily fitted to the teeth. With such a guide it was only necessary to hold the films in position against the aluminum plane, and results sufficiently accurate were obtained.

But, for reasons that must be obvious, no stereographs taken in that manner could be mathematically mounted for use, and to place them in their proper relative positions for observation was by no means easy. To partly overcome this difficulty, opaque guides, preferably two in number, are affixed either to the teeth or to the plane. These show upon the films, of course, and in mounting them it is only necessary to see that they register with each other, whereby this step is made easy and may be expeditiously accomplished.

Fig. 7.

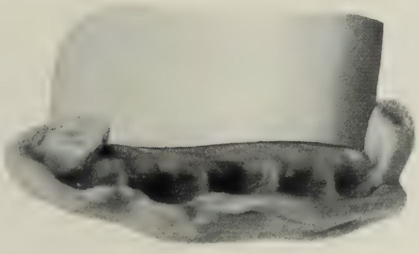
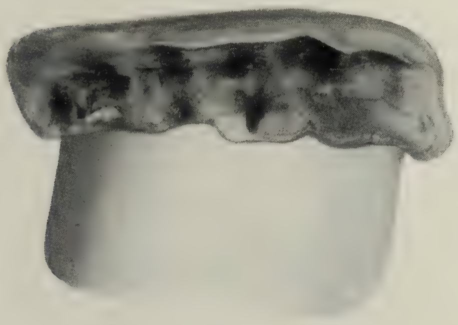


Fig. 8.

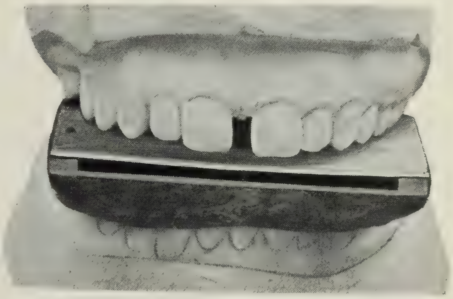


Film-holders are usually designed so that patients can close their teeth upon them. This permits of the act of swallowing, and therefore they are more comfortable for the patient and consequently insure better results.

If for any reason a picture is taken of the lower jaw with the teeth apart, a cork is placed between them, without which the lower jaw could not be held immovable.

The next step in this direction was to make a holder as shown in Fig. 3. The base is of brass, the top of aluminum. Modeling compound is molded along its edges to fit the teeth, which insures its being held immovably and in comfort. This is for the upper teeth only. There is just enough space between the upper and lower plates of this holder for the insertion of a film when inclosed in its light-proof cover, and the second one must necessarily be on the *exact plane* as was the first. This was found to be a most useful device.

Fig. 9.



Continued thought upon this subject led to the belief that correct stereographs could be taken without any film-holders or planes whatsoever, and upon trying out this idea the results bore out the correctness of the theory. While all pictures cannot be taken in this manner, when favorable conditions obtain, absolutely satisfactory results can be obtained.

For Fig. 4 the stereographs were taken by enveloping the films in rubber and placing the same between the teeth—no holder whatsoever being used.

(Figs. 4 and 5, being stereographs, are shown at end of article.)

Pictures shown in Fig. 5 were taken by merely holding the films in the mouth as is done for plain skiagraphs; the greatest care being taken that the patient did not move during their interchange.

In the early days of X-ray work the available apparatus was so weak that minutes were used for exposures where better results are now obtained in as many seconds. With such weak effects, practically no results could be obtained on the ordinary photographic emulsion, so this was doubled on special X-ray plates, as they are called. Dr. Price of Cleveland had some special triple-coated films made, which under these conditions were most advantageous. But with the

FIG. 10.

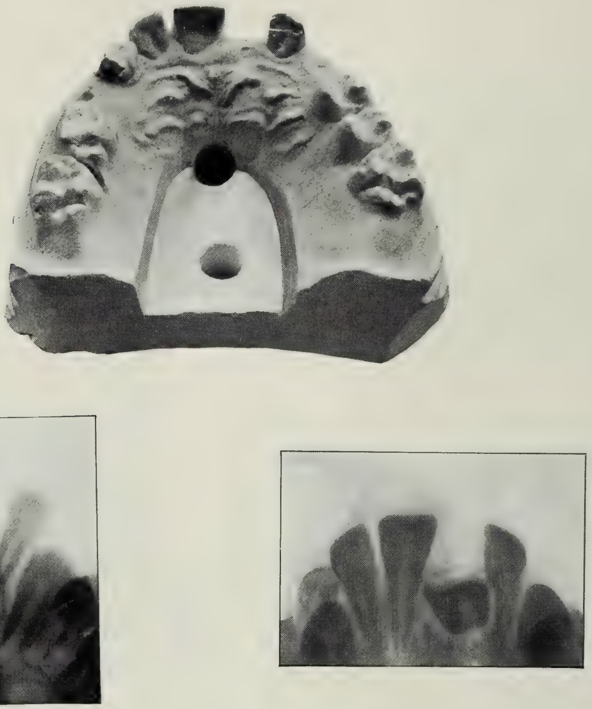


FIG. 11.

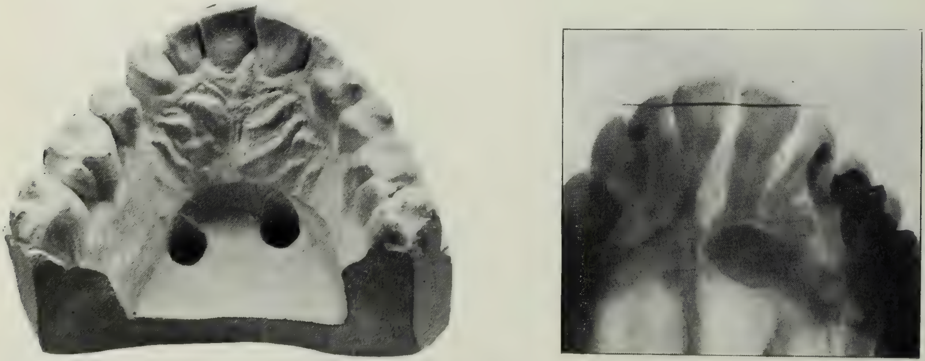


Fig. 4.

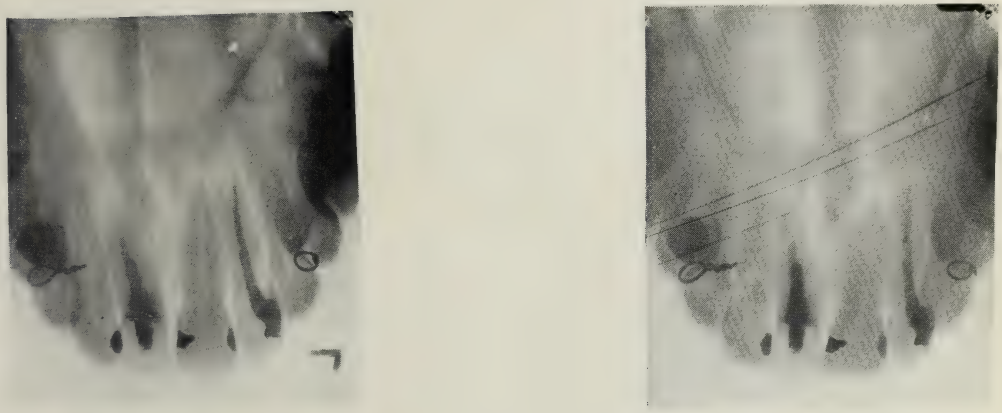


Fig. 5.

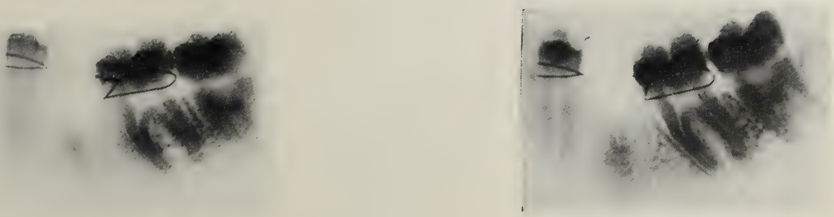


FIG. 10A.

FIG. 11A.

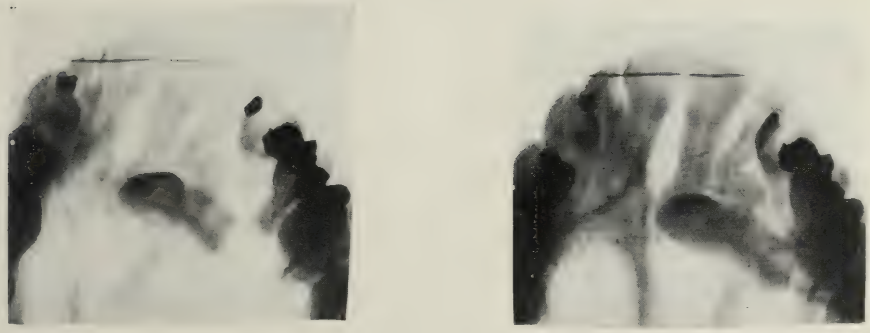


FIG. 12.

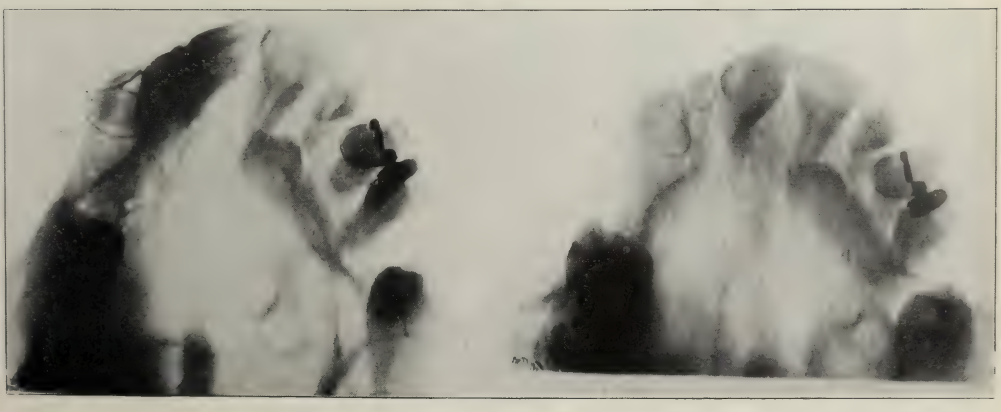


FIG. 13.

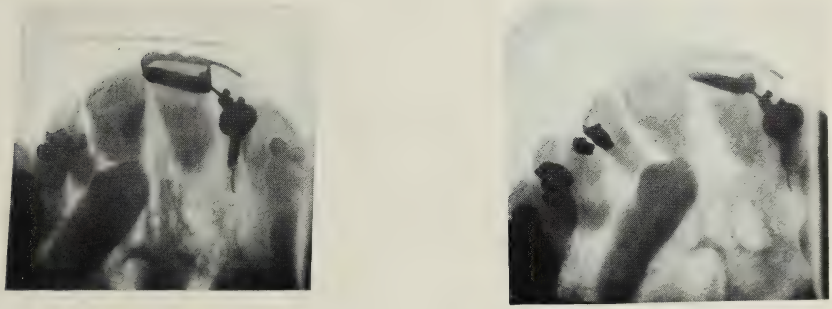
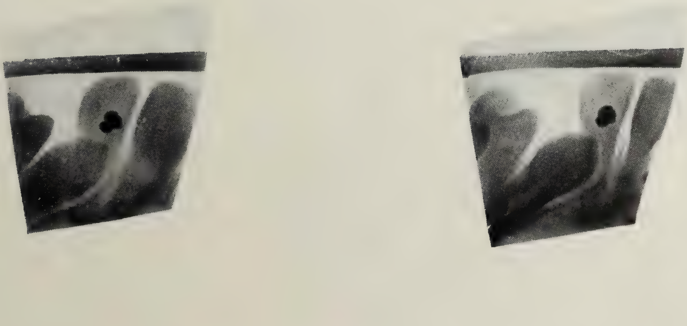


FIG. 14.



wonderful improvements made in the generating coil and tubes it is no longer necessary, for all practical work, to use any other than the ordinary emulsion as found upon high-class films on the market today.

It is not the object of this paper to go into the details of the technique of the preparation and developing of the films other than to say that their envelopment in rubber to render them light- and water-proof has so many advantages over paper that it is surprising to know that any operators still use the latter.

After the production of the stereographs, the next step is to mount them for viewing. As before stated, under the methods here described this cannot be done mathematically, or, to be more accurate, no attempt has yet been made to do so. Possibly that may be accomplished later on.

If prints are made, they can be accurately placed by means of the opaque guides, which must register with each other, and then pasted upon their mounts while the latter are in the stereoscope. But so many of the beauties of detail are lost in the prints that it is preferable to have transparencies made and mounted so as to be examined by transmitted light, or when practical to have the films themselves so mounted. (This would depend upon their density.)

For examining transparencies a special stereoscope shown in Fig. 6 is used, which is an improvement upon the original device previously shown. Provision is made for a ground-glass plate in the holder back of the stereograph, and as the bellows cut out all side light, the details of the picture are brought out to the best advantage.

One of the most remarkable features about the stereographs is this: The pictures are supposed to be taken the one as seen with the right eye, the other as seen with the left. If these are mounted in this order, and viewed in the stereoscope, the region depicted will be looked at *from* the *position the tube occupied.* But when the order is reversed, and the right-eye picture is placed before the left eye, and the left-eye picture before the right eye, a most wonderful transformation has taken place, for now the region is looked *at*, and *through, from the opposite side.* The latter, strange to say, appears to be the most desirable manner in which to view them.

In Fig. 7 is shown one of the aluminum planes fitted to the upper bicuspid region.

Fig. 8 is a plane fitted to the lower bicuspid region.

Fig. 9 shows the film-holder (Fig. 3) in position on a model.

In Fig. 10 is shown a model of a girl of ten with one central missing. Below it are two plain skiagraphs of the case, taken from different angles. From these it is clearly seen how misleading single pictures can be. The stereoscopic picture (see Fig. 10A) shows the true condition of affairs.

In Fig. 11 is seen a model of a lady of about forty, with the upper left canine missing, while the skiagraph attached shows it is within the jaw. Fig. 11A is a stereograph of the case.

Fig. 12 is rather interesting, as it shows an erupted canine in which the enamel is imperfect.

Fig. 13. In skiagraphing an implanted upper right lateral root the presence of the unsuspected impacted canine was shown upon the film. The appliance for steadying the implanted lateral is shown upon the central.

Fig. 14 is only interesting inasmuch as it was taken over ten years ago.

The writer has presented, in the past, several contributions upon the Roentgen ray, each of which was hardly published before it was out of date, so rapid was the progress in the art of skiagraphy. Possibly this paper will share the same fate. The Roentgen ray is the most marvelous of nature's wonders. Consider the thousand beautiful details wrought in a stereograph, bringing into view the otherwise invisible regions of the wonderful human body, and it is little wonder that the untiring fascination should have induced the preparation of the present paper, in the hope of once more stimulating interest in the subject.

SHRINKAGE IN CAST GOLD INLAYS.

By F. S. MEYER, D.M.D., Minneapolis, Minn.

WHEN the present method of inlaying gold was first given to the profession, I went through a period of skepticism. I had obtained in most cases very satisfactory results by the burnished gold matrix method, and had to be shown that the new method was better than the old which I had been using and in which I had become fairly expert.

My first cases comprised step cavities, where I had before striven and failed to satisfy myself that I could obtain perfect gingival margins without a lap of gold. I found that by touching up the inlays a little I could greatly improve on the old method.

Then followed a period of enthusiasm —or over-enthusiasm, as I soon found out. When I began to make mesio-occluso-distal fillings in bicuspids and molars, my troubles began. In adjusting them too much time was lost, as there was really nothing to guide me as to where to cut and where not. I then thought of oxidizing them. After this I never prepared to set an inlay unless I had a Bunsen burner burning upon the bracket table.

OXIDIZING METHOD FOR FITTING INLAYS IN CAVITIES.

The method employed consists of first going over every surface of the cavity sides of the inlay with an inverted cone gem stone of small size to within a fiftieth of an inch of the margin. A small bur may be used where the stone cannot reach. The inlay is then washed, held in the blue flame of the burner till it begins to redden, withdrawn for a moment, and dropped in water. When it is pressed to place, a bright spot will show the exact part of the contact point which it is necessary to grind to allow the inlay to slip down into the cavity, an excess of wax having been added at this point to allow for polishing. Any portion where the inlay binds in the cavity is then located by the same method, reoxidizing the inlay as may be necessary until it goes to place. A few taps with the mallet will facilitate the work.

SHRINKAGE OF THE INLAY WAX.

When I was asked a year or so ago to demonstrate this process of oxidizing an inlay in order to adjust it to place, I prepared a molar and bicuspid of steel, prepared step cavities in them, and hardened them. When I made the inlays I found that I could not get them up at the gingival margin as well as I had thought. Originally I had laid my defects to manipulation; now, when I had an absolutely rigid model, and with all my manipulation could not fit my inlay to place, I laid the cause to something else. I obtained a dial jaw-testing instrument, and set out to measure the expansion and contraction of the wax under thermal changes. I found that a wax cylinder of the length of a mesio-occluso-distal inlay for a molar, as it passed from the temperature of the mouth to that of the water from the tap—a range of about forty degrees—shrank about three thousandths of an inch. Thereafter I used warm water in mixing the investment. This helped but little, as the warm water cooled before the investment had crystallized.

ANALYSIS OF SHRINKAGE.

Finding that there was a great difference in the time taken to adjust two mesio-occluso-distal inlays for molars of apparently the same size, I looked to the cavity preparation. I prepared a diagram of the occlusal outline of a mesio-occluso-distal inlay for a molar (Fig. 1) and analyzed it as follows: If the distance between *a* and *c* is equal to the distance between *c* and *d*, the shrinkage from *a* to *c* is equal to the shrinkage from *c* to *d;* then also the shrinkage toward any point, *y*, along the line *a d* is compensated for by the shrinkage away from point *y*. Hence there will be a shoulder at *a* and *b* (Fig. 1), and the inlay shrinks along *a d* and *b d*. We further see from Fig. 1 that we would

FIG. 1.

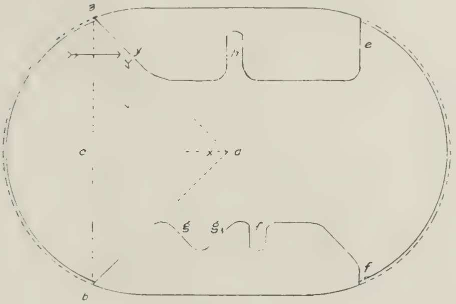


FIG. 2.

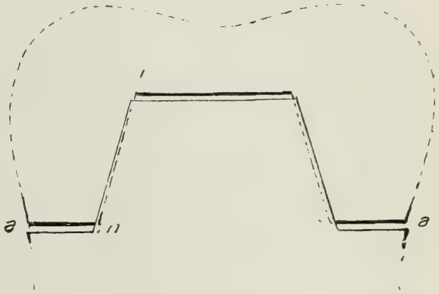


FIG. 3.

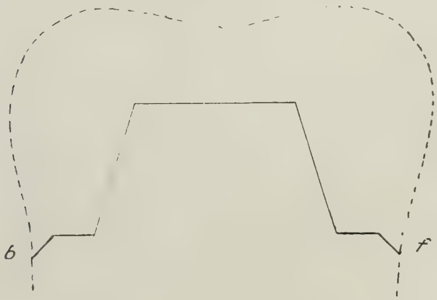


FIG. 4.

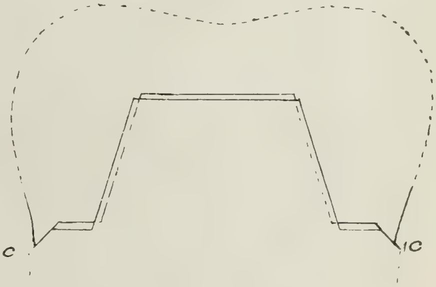


FIG. 5.

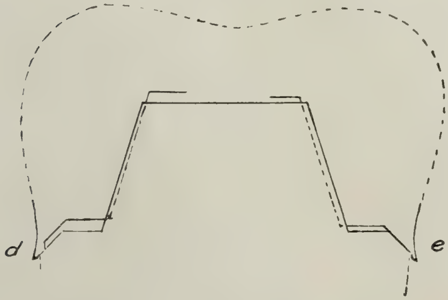
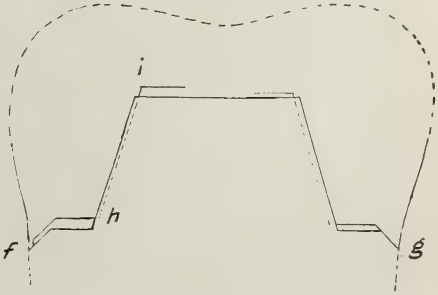


FIG. 6.



have a binding of the inlay at *f* and *e*; *h*, being in the center, would show no binding. From Fig. 1 it is easily deduced that as *c d* becomes smaller, the angle at *x* becomes larger. In other words, the margin *a y* runs toward the center of the cavity *d*. We further see that angle *x* may be larger in mesio-occlusal or disto-occlusal than in mesio-disto-occlusal fillings. We also see that by cutting the corner *f* as at *g* we compensate for the shrinkage here. The surface *i h* in Fig. 6 may be trimmed away before adjusting the inlay to place.

Fig. 7.

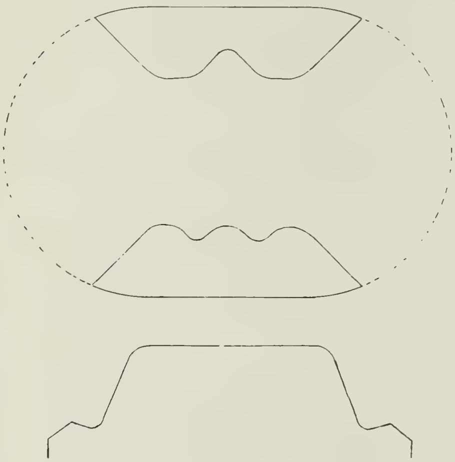
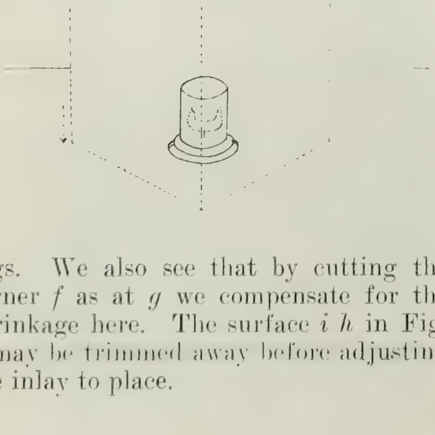


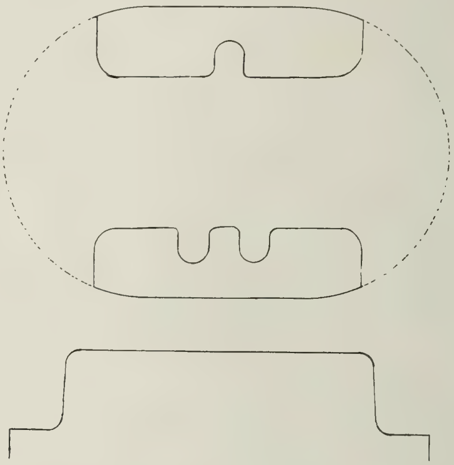
Fig. 9.



EFFECTS OF SHRINKAGE ON THE FIT OF INLAYS.

The greatest trouble, however, has been found to be at the gingival margin, as I have already stated. There are four reasons for this, due to shrinkage alone, all of which may be practically remedied. First there is the shrinkage of the wax as it cools to the temperature of the mouth. All of the margins may be burnished with a warm spatula, but at the gingival margin this is more difficult, especially if the operator is not aware of the amount of shrinkage. Next there is the shrinkage of the wax as it passes to the temperature of the investment; then there is the shrinkage of the gold in congealing, and finally the operator's inability to force the inlay to place on account of binding. There is still another reason for trouble at the gingival margin and elsewhere, which occurs only when the wax is built flush with the tooth, of which I shall speak later.

Fig. 8.



Let Figs. 2 and 3 represent the gingival and pulpal walls of a mesio-occluso-distal cavity in a molar as viewed from the buccal surface. In Fig. 2 it is readily seen that the inlay will not go to place on account of shrinkage. It is apparent that unless there is an overlap of gold at *a*, there will be a crevice at the margin here, even though the surface *i h* be trimmed away. The operator may touch up the labial or buccal and lingual margins, he may weld over the occlusal margin if the inlay does not go to place, but the gingival margin remains defective. As proof of the fact that the inlay does not go to place as a rule, let every operator ask himself if he ever had to trim away any gold from the occlusal surface when he was sure that he had made a perfect wax model. This is the greatest source of trouble here.

On the other hand, if there is a bevel at the gingival margin, as at *b* (Fig. 3), the shrinkage of the inlay from mesial to distal pulls the bevel on the gold against the bevel on the tooth, leaving a shoulder on the tooth at *c* (Fig. 4). If there is a little overlap of gold to work on, it may be dressed off, and the inlay may go to place, as at *e* in Fig. 5. By dressing off the excess gold, perfect margins can be obtained, as at *g* in Fig. 6. If the inlay cannot be carried clear up, which is usually the case, the mesiodistal shrinkage pulls the overlap of gold into the bevel on the tooth, as at *d* in Fig. 5. After touching up and polishing the inlay flush, a condition will result as shown at *f* in Fig. 6.

To prove my theory, I made two lower molars of steel. In one I prepared what I considered a theoretically correct cavity (Fig. 7). Part 1 shows the occlusal outline, and part 2 the gingival and pulpal walls as seen from the buccal surface. In the other molar I prepared a theoretically incorrect cavity (Fig. 8).

I made the inlays and proved my theory. With a little adjustment I obtained perfect margins in the correct cavity, while the inlays would not go half into place in the incorrect cavity.

Cavity preparation should be kept in mind as far as possible in all inlays.

METHOD OF INVESTING, TO COMPENSATE FOR SHRINKAGE.

I then determined to cast an inlay that would go to place in the faulty cavity. I made a hole near the bottom of an empty investment can and inserted an electric bulb socket. By inverting this can, after fastening a four-candle-power bulb in the socket, a little oven was improvised. (Fig. 9.) I then mixed some of Taggart's investment with water at about 140°. This cooled to about 100° by the time it was ready for use.

I then invested a wax model of the theoretically incorrect cavity and set it under the little oven, which had been previously lighted. By the time the investment crystallized it had risen in temperature considerably, and the inlay, having assumed the temperature of the investment, had of course expanded. I burned out the wax and cast an inlay which, after the slight imperfections had been trimmed off, fitted in place perfectly at the gingival margin. With more quickly setting investments, not so much time is left for heating up before the investment crystallizes; hence the investment, when being mixed, must be warmer. Heating the ring will help somewhat. There are so many investment compounds and there is so much difference in the time taken for mixing that it will be necessary in a large measure for each operator to decide for himself the optimum temperature of the water to start with. If the investment employed crystallizes at 98°, a perfect mold will result, provided the wax model was perfect in the cavity. Any extra heating goes toward compensating for shrinkage of the gold in congealing.

REASONS FOR LEAVING A SLIGHT OVERLAP OF GOLD.

On examining the margins of these inlays, I found that they were not perfect, even though the wax models had been carved up flush with the tooth. In other words, the gold did not fill the cavity completely. I also found that the sharper the angle to which the gold was cast, the more the inlay failed to fill out the cavity completely. This, of course, could be easily overcome by allowing a little overlap of gold and retouching the inlay when setting it. This overlap should be very slight. The problem, however, still remained to be solved.

I found quite frequently, when casting a large gold inlay, that the sprue would break off at the inlay, leaving a porosity in the gold at that point. I learned that the gold sprue, being a smaller mass of gold than the inlay, would start to congeal first. As the inlay began to congeal it would shrink and exert tension upon the partly congealed gold sprue, which, being held rigid, would not give; hence it would break directly at the inlay. From this I deduced that the sharp margins of the gold inlay would congeal first, but, not being held rigid, they would be pulled *en masse* toward the bulk of the gold as it shrank. From this we learn that, in order to have the gold shrink uniformly throughout its mass, it will be necessary to have a very hot investment. Yet, with our present investment, the distortion produced by heating up to a very high heat is greater, perhaps, than the distortion produced by uneven shrinkage. At any rate, this trouble can so easily be overcome by a little lap of gold that it is only of scientific interest.

Fig. 10.

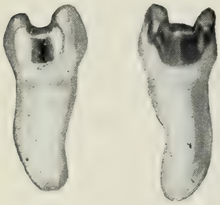


Fig. 11.

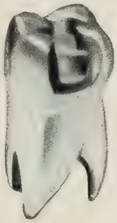


Fig. 12.

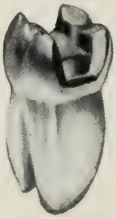


Fig. 13.

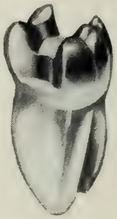


Fig. 14.

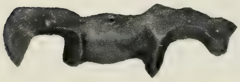


Fig. 15.

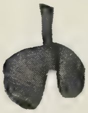


Fig. 16.

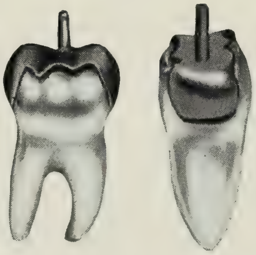


Fig. 17.

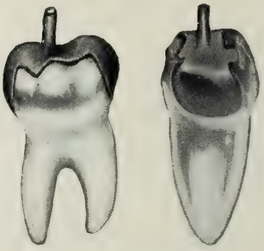


Fig. 18.

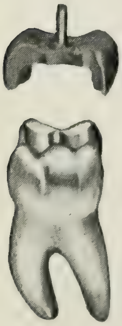


Fig. 19.

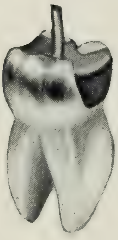


Fig. 20.

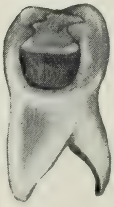
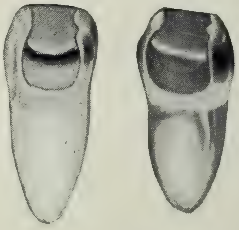


Fig. 21.



EXPLANATION OF MODELS.

Fig. 10 shows a bicuspid with a mesio-occluso-distal cavity, faulty at the gingival and pulpal walls. The gingival wall has no bevel, and the pulpal wall is so shallow that, when the inlay is driven down, it flares out at the gingival margins (see Fig. 14).

Fig. 11 shows an upper molar with a step cavity, also faulty at the gingival wall. The models shown in Figs. 10 and 11 were made over a year ago, and it was by means of these that I discovered the great defects at the gingival margins.

Fig. 12 shows a lower right molar with faulty cavity preparation.

Fig. 13 shows a lower left molar with a theoretically correct cavity.

Fig. 14 shows porosity at the point of insertion of the sprue in the inlay, and defects at the gingival margins. The wax model was made at room temperature, so that there was no more shrinkage in the wax model than the difference of the temperature of the atmosphere and that of the investment (ten degrees) would produce. The shrinkage, therefore, that is shown in Fig. 14 is mostly due to the congealing of the gold.

Fig. 15 was likewise made at room temperature, and invested at the temperature of water drawn from a faucet.

Fig. 16 shows an inlay in the faulty cavity shown in Fig. 12. For this the wax model was made at the temperature of the mouth, and then invested at about 60°. Note the result of the mesio-distal shrinkage at the gingival margins. It can readily be seen that, if this inlay were adjusted to place, it would not completely fill the cavity at the gingival margins, to say nothing about further distortion in such adjustment.

Fig. 17 shows the first inlay I cast by the new method of investing. Note the fulness at the gingival margins. With a very little retouching, this inlay would go to place all around. Note also how much nearer it goes to place in the cavity shown in Fig. 12 than the inlay in Fig. 16, which was cast a great deal smoother.

Fig. 18 shows an inlay invested at the temperature of water from the faucet, and cast from a model made at the temperature of the mouth. The bevel at the gingival margins of the inlay seems to be gone, probably owing to the waxing up. Note that, where the lap of gold is wanting, there will be a defect when the inlay is adjusted to place in the cavity shown in Fig. 13.

Fig. 19 shows an inlay cast by the new process described, for the faulty cavity shown in Fig. 12. The wax model was made without any lap of gold at the margins. Note the lack of gold at the margins, due to the effort to cast to a knife-edge. This is mostly due to uneven cooling, the margins cooling first and being drawn toward the greater mass of molten gold as it cools.

Fig. 20 shows a polished step filling for the upper molar shown in Fig. 11. In casting this inlay, I strove but failed to obtain perfect gingival margins by the usual methods.

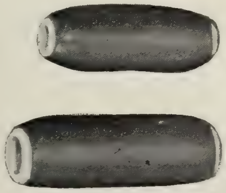
Fig. 21 shows a polished mesio-occluso-distal inlay in the cavity illustrated in Fig. 13. The lap at the gingival margins is made to compensate for my inability to get an inlay to place. I have oxidized the inlay to discover the points that bind in touching it up.

There are defects in these models owing to the fact that it is more difficult to make a perfect wax model in a cold steel tooth, possessing great conductivity that tends toward uneven shrinkage, than it is in the natural tooth at body heat and having but slight conductivity.

TESTING EXPANSION AND CONTRACTION OF WAX.

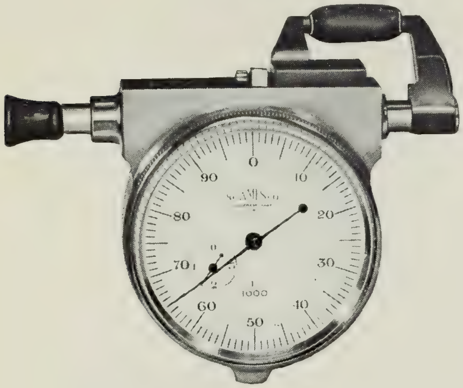
In testing the wax employed for expansion and contraction, I have obtained the best readings by using a wax cylinder (Fig. 22) twice the mesio-occluso-distal length of a molar, and water ranging in temperature from 40° to 120°. By dividing the reading by 4, the shrinkage of a

Fig. 22.



mesio-occluso-distal wax model is obtained, and the error reduced to a minimum.

Fig. 23.



It will be noticed that, after the wax has contracted as much as it will, it will never show an expansion to its original length within one or two thousandths of an inch. This is probably due to the fact that, in expanding, it has to overcome friction and the pressure of the springs of the micrometer. (See Fig. 23.) If the water should be too warm, the jaws of the instrument would settle into the wax to some extent. Care must be taken that no water or dirt gets into the instrument, since it is balanced very delicately.

CONCLUSIONS.

In my mind, these experiments lead to two conclusions. First: With our present knowledge of waxes and investments, it seems very difficult to cast a scientifically perfect inlay. Second: Within the range of imperfections in our work, we can cast an inlay which, after a little touching up, will be practically perfect.

A BRIDGE WITH PLUMPER FOR RESTORING FACIAL EXPRESSION.

By EDWIN P. WRIGHT, D.D.S., Richmond, Va.

THERE is probably no class of work within the range of dental operations the general plan of which is more uniform or the technique of which is better understood than the construction of bridges. The objections ordinarily made to bridge work are that many bridges are unsanitary, and that some fail entirely to restore the features when much tissue has been lost.

I wish to show herewith photographs of a removable plumper, a device which will go a long way toward remedying many of the objections to bridge work, and which will entirely solve the difficulty in cases where the cheek or lip has fallen in and needs to be replaced and supported.

The case described and illustrated involves the upper right side, the canine and third molar being utilized as abutments. (See Fig. 1.) Four dimensions make up the span. The construction of the bridge is familiar, variations from the ordinary being readily seen as we proceed.

Having made and adjusted the two abutments for the bridge, I removed the molar crown from the mouth, and before taking the final impression, selected a piece of clasp metal of No. 30-gage thickness and about three inches long. I cut this into two equal parts and soldered them together; from this reinforced plate I cut a strip one-half inch long, placed the longer piece in a vise, and bent the shorter piece over one end of the long one until it clasped the long piece firmly. Thus a dependable support is obtained for the plumper, the two pieces having the shape and function of a slot and bar. The slot piece is then waxed to the molar shell crown at the center of the buccal surface, mesio-distally, as shown at A in Figs. 2 and 3—the opening being at the upper portion of the shell—and the crown is tried on the tooth to see that the slot piece is free of the gum and does not interfere with the bite, also that it is in such position on the molar that a separating file may be passed easily into the slot from the posterior of the opposite abutment, changing the waxing until this can be done. The crown is then removed from the tooth and invested, and the back of the slot piece is soldered to the crown, taking care to keep the solder out of the inside of the slot. If the slot has been forced away from the side of the crown in adjusting, it will be noticed when the wax is washed out, and the space between it and the crown should be packed with gold foil before soldering. When the slot has been soldered to the crown, two or three large pieces of solder of the same karat are sweated to the crown to strengthen it in that section. The abutments are placed in the mouth, a final impression is taken, a model made, the bite taken, and the case is ready for the selection of the facings.

The unsanitary conditions too often produced by bridges are due to the wrong placing of the dummies, making them too long, or putting them in incorrect positions on the ridges. Dummies should be of proper length and placed in proper alignment; failure to observe these points brings about difficulties in properly cleansing a bridge. When the dummies are too long and are used to fill up a large depression in the gum, or when pockets and angles inaccessible to the brush are present, a bridge is a very faulty substitute. It is for the correction of these errors that I have devised the plumper. It is of no consequence how deep the depression in the gums, if we have a practical way of filling it up. If the absorption of tissues is very great, and the cheek or lip, or both, have fallen in greatly, it is most important to employ some means besides bridge teeth for replacing the lost tissues and restoring expression. This can be done properly only by employing a removable device which will permit of the bridge and soft tissues being properly brushed, every part of the bridge being readily accessible to the brush. With the appliance described it is an easy matter to brush the entire bridge and the contiguous soft tissues. The exposed ends of the dummies, as well as the abutments, are easily reached with a correctly shaped brush.

Fig. 1.

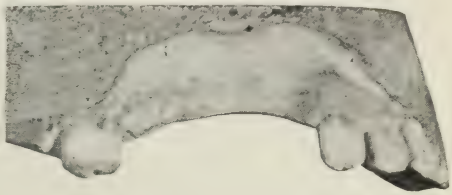


Fig. 2.

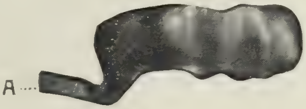


Fig. 3.

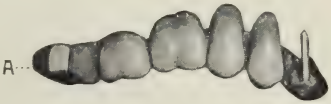
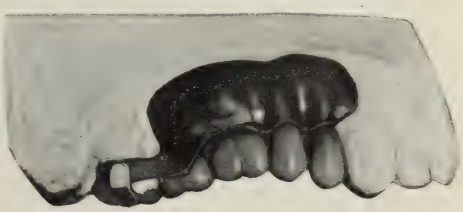


Fig. 4.



The facings are selected as to size and conformity with the remaining teeth as if they were intended for a rubber plate. As the necks of these facings are intended to partially support the plumper, the backings must extend to the cervix as well as to the occluding surface, giving the porcelain and gold backing at the neck somewhat of a wedge shape from the body of the facing to the neck of the tooth. (See Fig. 3.) When the bridge is ready for investing, it is securely waxed together, and with a sharp knife the abutments are cut loose without destroying the cast. The bridge is then invested and finished with a smooth surface, the finishing on the lathe not being done until the rubber is vulcanized. Laying aside the bridge, No. 30 or No. 40 tin foil is burnished over the surface of the cast from the center of the ridge up over the edge of plaster above the highest point at which the plumper terminates under the muscle. The bridge is then placed upon the cast, and the space above is filled with wax, which is carved and shaped so as to lend ample support for the overlying soft tissue. The bridge and wax plumper are then placed in the mouth, if desired, to determine the correct amount and position of the wax. When the waxing is done, the bridge is removed with the wax plumper from the plaster model, and invested. When the plaster is hard, the flask is heated and opened, the wax washed out, and the ends of the teeth and all portions of the bridge which will come into contact with the rubber are covered with a piece of the same tin foil. This is done carefully, and the foil is doubled if desirable, because the rubber will stick to the gold of the bridge if allowed to come into contact with it. The necks of the teeth should be embedded in the rubber just far enough to make a good gum line and show correct festoons, but not too far, so as to lock the bridge and rubber together when they are in the mouth. The case is then packed with red and pink rubber, finished with great care around the necks of the teeth, and tried in the mouth. The vulcanite is finished, the bridge polished, the pieces are assembled, and the bridge is set in place while the plumper is in place on the bridge. (See Fig. 4.) I find this latter precaution necessary at times because of a slight difference in the way in which the abutments go to place when the cement is in them, causing a slight variation in the pitch of the attachment, with consequent pressure upon the gums. The plumper being in place, morover, assists the operator in carrying the bridge correctly and quickly to place. The piece should not be cemented in unless the operator is certain that he can remove the plumper. When the cement is hard, the plumper may be removed and reamed out with a large bur on the gingival side, making it quite light and thin and leaving the edges all around in contact with the gums. If this cutting is done at once, it should not extend too near the margin, lest there be necessity for reduction of its lines to relieve pressure of some muscle. On the whole, it is better to wait a few days to ascertain whether there is too much pressure upon the soft tissue before reaming the plumper.

This plumper is equally as serviceable, and no doubt just as practical, if made of porcelain.

In this device no other support is provided for than that upon the distal attachment and that supplied by the necks of the teeth, for the reason that no further support is required in this case, but should it be necessary to secure a firmer support, a device can readily be added at some point near the front of the bridge.

WAYS AND MEANS OF ADVANCING THE CAUSE OF MOUTH HYGIENE IN SUCH A WAY AS TO BENEFIT THE PUBLIC AND THE PROFESSION.

By **HERBERT L. WHEELER, D.D.S., New York, N. Y.**

(Read before the Seventh and Eighth District Dental Societies of the State of New York, at their forty-third annual union meeting, Buffalo, N. Y., November 9, 1911.)

THE subject of this paper is one that covers such a vast field that a volume—and not only a volume, but a whole library—could be written upon it. I shall, however, endeavor to confine myself to a discussion of facts as I know them.

THE AWAKENING OF THE ORAL HYGIENE MOVEMENT.

It is not so many years ago when Rochester began its attempt to serve the poor people by the establishment of a free dental clinic, and, so far as I know, the Rochester dental clinic is one of the oldest in the country; it is certainly the oldest that has maintained itself in active service up to the present time. It may be considered practically an axiom that one of the best ways to achieve the ability to serve the public and profession by means of mouth hygiene is to so act as a profession that we shall have the unqualified confidence of the public. I think we will all assent to that. But to do that is not so easy, especially when we observe the number of extremely enthusiastic individuals who have become interested in this subject, and when we hear, as we do almost constantly, the wild and injudicious statements that they put forth concerning this subject. It was not so many years ago, however, that the average man who was interested in the question of mouth hygiene, and who voiced his interest by advocating that some action be taken by the societies, was looked upon as somewhat of a sensationalist, with an evident desire to attain publicity. In a great many cases this has been unfortunately too true; in fact, it has been true in so many cases that were it not that the cause had real merit and value, it would long since have been swamped by its injudicious friends. In the last two or three years, the subject has been taken up in nearly all sections of these United States of America, also in Germany and England—in fact, in practically all of continental Europe. In America the various means developed to obtain the desired ends have varied with the localities, customs, and temperament of the different sections, and it is probable that a method that will do in one locality may not work out well in another.

There are various methods, all of which seem good and desirable, and for those that have demonstrated their usefulness by achieving results I register my admiration. In some cases, however, I feel sure that great energy and, one might say, considerable intelligence—also a great deal of money—have been expended in a way calculated to make the judicious grieve and the friends of the cause grow sick at heart. The worst of it is that these peculiar methods have not only failed to achieve substantial results, but they have brought ridicule and embarrassment to the cause that they were no doubt intended to serve. This work has been started, in almost all localities, through the efforts of either public-spirited citizens who have contributed directly to the cause, or by charitable or benevolent institutions that have established dental clinics and equipped them, and by the dentists who have given their time. This is all right and proper, and the establishment of places where the needy poor can receive relief from their immediate pains is a very satisfactory way of dealing with the subject.

THE DENTAL PROFESSION'S INTEREST IN THE ORAL HYGIENE MOVEMENT.

But the subject is too great to be handled in any such way on general principles. Dentistry, if it is a profession—and we all believe it to be such—is a specialty of the healing art. The fact that we have a different degree in no way interferes with the fact that we are dealing with organs of the human body that are as intimately and closely connected with the general system as any other organs upon which specialties have been built. The fact also remains that—while I do not intend to discuss the sociological problem as to whether it was wise to furnish to the indigent public free dental service—if it is decided to furnish free service for the care of the eyes, or ears, or nose, or throat, or lungs, or any other part of the human system, to ignore and neglect the care of the mouth and teeth would mean to lock the windows against theft, and leave the door wide open; for an unclean, ill-kept mouth is one of the most fruitful sources of infection of the throat, the posterior nasal cavity, the lungs, and the alimentary canal. It would be as reasonable to deliberately permit the material that would produce an outbreak of yellow fever to be scattered freely about the streets, and then to attempt to remedy the trouble by merely treating the disease as it is to attempt to treat the various diseases of the general system and ignore the relation of the mouth, with its infectious conditions. To be sure there is much that can be said upon the narrower field of diseased teeth alone, but I am convinced that the principle upon which we must gain recognition and the line upon which we must make good, if we desire to fill the position that is being rapidly opened to us, is not only to prove ourselves able to care for the welfare of the teeth, but also to prevent those conditions in the human mouth that produce infection. And not only must we be able to prevent infection, or at least largely retard it, by way of the oral cavity, by persuading and training the individual to keep the mouth clean; we must demonstrate, as I believe we can, that an intelligent care and cleanliness of the mouth and teeth not only lessens the liability to infection by disease germs in such diseases as tonsillitis, diphtheria, pneumonia, tuberculosis, gastritis, and a host of others, but it will also be found that, because of a better quality of the circulating fluid and a good circulation, the physical and mental growth and development of the individual is enhanced, and that in many instances the children whose ability to keep up in their classes in our public schools is questionable will be aided sufficiently to permit them to achieve a little better results than they would have with a filthy and unhealthy condition of the oral cavity.

These are, I believe, sufficient reasons for the desire on the part of our profession to take part in the modern attempt at looking out for the physical welfare of the children who are to become our future citizens.

As I have previously stated, the beginnings of this work have been very largely in the efforts of individual members of the profession, outsiders who appreciated the value of this work, and benevolent and philanthropic organizations; and this was essential in bringing this matter before the public and demonstrating its necessity. Now that we may fairly state that its necessity has been demonstrated, will the work that has been instituted by the various charity organizations and benevolent institutions be sufficient to make any great headway in the thousands and thousands of cases where help is needed? I think dentists will agree with me that they will not. Furthermore, dental work is exacting, and in addition, the habit which we have acquired of giving little or no time outside of our office for charitable purposes has become a part of our constitutional quality, and as a result a very small proportion of the profession are willing to give much of their time for any extended period. The strain put upon them is too great—and when we come to consider the situation it is not surprising that this is so, for the average practitioner who conscientiously and willingly gives up a certain amount of his time weekly or monthly in the service of the unfortunate is likely to stand somewhat above the average in ability, and in all probability the demand made upon his time by his private practice will become heavier and heavier as the years go by. All of us engaged in this profession are inclined to take too little rather than too much outdoor exercise, and when a dentist's practice grows to a point where he is tied down closely for from seven to ten hours a day in the small room which serves as his office, he feels that all his spare time, when he can get away from his practice, should be devoted to some kind of recreation. We must admit that it is not recreation to go from a dental office to a hospital or clinic which is less well equipped and less convenient for the operator than his office, and there give up several hours in the continuance of a work that he is already over-tired from. I therefore do not wonder that it is difficult to keep dental clinic staffs in hospitals well filled and in active service constantly. The fact, however, that the situation is as I have described it, does not, in my opinion, excuse the dentists as a profession or individually from giving a certain amount of their time toward solving this problem of the physical welfare of the community, because, if the problem is solved, as far as it concerns mouth hygiene it must be solved through the dental profession. And unless the dental profession accepts its responsibility and does its share in propagating this modern gospel of preventive medicine, the question of mouth hygiene not only will not be properly or intelligently settled, but dentistry will have lost the greatest and grandest opportunity that has ever come to it or, in my opinion, ever will come to it, for demonstrating to the public that it is a liberal profession, and that it has, as the other professions have, for its foundation a genuine desire to serve the public instead of exploiting it.

THE PHYSICIAN'S ATTITUDE TOWARD ORAL HYGIENE.

I have already seen some of the results that may follow apathy, misdirected energy, or lack of public confidence, and, I might add, cupidity and unfairness on the part of physicians. I do not wish to be misunderstood. I do not desire to reflect upon physicians as a whole. I have found the vast majority of them absolutely fair, just, and interested in this movement, but I will cite a concrete case which will explain more than many words would.

In a New Jersey city I was told recently that a dental inspector had been appointed under the law of that state, which permits a certain sum of money—perhaps $5000—to be spent annually by cities, under certain regulations and directions, for dental purposes. This inspector, although a dental inspector appointed under that law, if I am not misinformed, was not a dentist but a physician. In other words, as soon as the law had given the municipality the right to appropriate money for dental purposes, instead of choosing a dentist they chose a physician. To state the case fairly and clearly and without prejudice, it is certain that no physician—and there are no exceptions to this fact—who has not practiced dentistry is capable of acting as a dental inspector of the school children of any city in America, and of giving a statement of the conditions found in their mouths or interpreting their meaning in a way that can be made of value, no matter what the general qualities or ability of such a physician may be. It is no reflection on a physician to say that he knows little or nothing about the mouth. He is not trained: the question of the condition of the mouth and teeth is practically ignored in all medical colleges today, for the reason that the curriculum of medical schools is already overloaded. Dentists are supposed to know and understand mouth conditions, and the colleges are only too glad to leave this subject to whom it belongs, *i.e.* the dentists. And this is as it should be. The idea of establishing a dental chair in the various medical schools is a dream, based upon lack of experience.

PUBLIC APPROPRIATIONS NEEDED.

The charitable and benevolent institutions, it will be agreed, are not able to cope with this subject in its entirety; it must be taken up by the public officials, either through the health or school departments, and made a part of the regular care for the physical welfare of the children of the community. This will cost money, and in order to obtain this money appropriations must be made from the public treasury in the same way as appropriations are made for physicians to inspect the eyes, the throat, and the nasal cavity of school children. The people are willing to concede such appropriations once they are convinced and shown, as they very readily can be, that an infected and unclean mouth is an important factor in the question of health and disease. In fact, the public will no more neglect to attend to oral hygiene than they will neglect to attend to proper quarantine in our seaport cities.

THE DENTIST'S CO-OPERATION WITH THE MUNICIPAL AUTHORITIES.

Supposing that by a proper discussion of this subject or by a demonstration of the pioneer work that has been achieved in our dental clinics, the public is convinced that proper attention to the care of the mouth and teeth is a necessity. How will they go about obtaining this? Will they pass a law, as in New Jersey, permitting municipalities to spend the sum of $5000 annually for this purpose, and then have some municipalities promptly take advantage thereof and appoint physicians to look out for the mouth and teeth of the school children, as has been done in North Plainfield, N. J.? I do not believe that the medical profession as a whole desires this any more than the dental profession, neither do I believe that the men who will be responsible in the boards of health and of education for the appointment of men to fill these positions, prefer physicians to dentists for this work. But unless the dentists organize themselves, take an active interest in this matter, and are prepared to lend sympathetic assistance to the various municipal authorities, they will have nobody but themselves to blame if they are ignored, and if the whole object of this movement is defeated by the appointment of physicians. This movement concerns most vitally the dental profession, not merely a few individuals who, because of a personal acquaintance, might ask for an appointment as a favor. We need not ask for favors in this matter. Through the work that is being done through such agencies as the New York state board of health, the New York city board of health, Bellevue and allied hospitals, and the Philadelphia health department, the public is fast becoming educated to the necessity of oral hygiene. But when boards of health, boards of education, and hospital departments are ready to recognize the situation and to fulfil their part by the appointment of dentists to the various positions needed for carrying on this work, they naturally look first to the organized dental profession of their particular locality, as the organized dental profession of each locality is properly looked upon by the public as the locally representative body of the profession. It is to such a representative body of the profession that the municipal authorities are certain to go for assistance in carrying on this work, and unless the dental societies of the various departments and cities are up to date, unless they have considered this question and are prepared to render assistance of an unselfish and intelligent sort to the municipal authorities, the cause will receive a setback, and what now seems really our province and the opportunity that is now most certainly ours will vanish. The sensational, selfish, and ill-considered "yammering" of highly neurotic individuals who crave notoriety will be of little use when the time comes to offer advice and assistance to our municipal authorities in the practical solution of this problem.

What is needed, then, is solid, level-headed advice based upon practical experience, and the average official of the board of education or board of health is very quick to distinguish between that type of advisers and those who are simply exploiting a great and useful cause for their own selfish purposes.

Let me therefore urge you to get as much experience as possible by organizing staffs for the various hospitals that can be persuaded to equip a dental department, by making an examination of the public school children, and by engaging the interest of the school department and offering practical advice. If the dental profession will work on terms of good-fellowship and mutual helpfulness with the boards of health, these boards, appreciating the extension of their usefulness, will certainly urge the dentists to become a part of their machinery in the warfare against disease.

In order to achieve this it is not necessary to attempt to cover the whole field at once. In fact, there are many honest, sincere, and well-intentioned people who are rather inclined to doubt the advisability of spending the people's money on such a foolish thing as dentistry! They have gotten along most of their lives with little or no dentistry, except perhaps the extraction of a few teeth, and as far as they can see, although they have ignored the tooth-brush, evaded the dentist, and defied microbes, they have kept well and vigorous. There are many such people in every community, and they are often hard-headed, practical individuals. It is not an easy task to convince such individuals all at once that it will improve the physical condition of the children to have their dental welfare looked after. It requires patience, unfailing good-nature, and a willingness always to show the reason why. In fact, in many instances the chief reason, in my opinion, why dental clinics should be established is in order that we may have material of a sufficiently well known and accurate character to show to just such skeptical people in order to convince them. I understand that in Buffalo some attempts are being made at grappling with this problem.

DENTAL DISPENSARIES IN VARIOUS CITIES.

Rochester is practically the pioneer in this work. It is being carried on in Syracuse; Elmira has set us an example well worthy of emulation, and in New York, which offers a very large field, we have a good many different methods of working at once. All of these efforts have been of advantage. St. Bartholomew's, I think, has the honor of being the first hospital to establish a dental dispensary in New York city, which is probably about as old as the Rochester institution. That dispensary is still doing work, but the system under which it was established had to be changed. Originally fourteen or fifteen of us went there one afternoon or evening each week, and we were able, in two or three hours, to attend to from seven to fifteen patients, tiding them over and doing the best we could to relieve them of their pain and trouble. This method worked for a while, until certain conditions produced dissatisfaction on the part of the dentists, and it was given up. Then, the equipment having been purchased and the room set apart, the institution considered it hardly desirable to give up the work, and dentists were employed on a salary. That system has been maintained to this day; every afternoon in the week, except Sunday, the dental department or clinic is open, and the work is carried on by young practitioners who receive a small salary.

The work established by the Children's Aid Society, which has been discussed so much, has also had its ups and downs, and at the present time I am informed that although that society has three different institutions with a dental equipment, only one is in operation, and to this only one practitioner is attached, who serves gratuitously. I tried to persuade the Children's Aid Society to pay a small salary and engage regular practitioners, but they were unwilling to do so, with the result that at the present time the capital which they have invested in dental equipment is practically idle.

Another institution, which was established through the raising of funds by

Magistrate Peter T. Barlow of New York, has been very successful, but there the dentists have been paid from the beginning. This has been an interesting experiment for more than one reason. It is practically the beginning of the clinics that will be maintained by the board of health, for this clinic may be taken over by the New York city board of health, and carried on as one of its regular clinics.

*New York city has voted to establish eight dental clinics with twenty-four attending dentists, a great many factors contributing to this resolution. The honor of having introduced this bill belongs to our most efficient and able health commissioner, Dr. E. J. Lederle. Dr. Lederle has worked from the beginning to have dentists added to his board of inspectors, and he has succeeded magnificently. He called for nine dental clinics, with twenty-seven dentists, and he has been given eight clinics and twenty-four dentists. The dental profession certainly owes Dr. Lederle a debt of gratitude for the service he has rendered not only to the profession in New York city and New York state, but in this country. These dentists will be employed on a salary, and will devote their entire time to the work. If they are properly directed, as I am sure they will be as long as Dr. Lederle is health commissioner, and this institution is once established on a firm and intelligent basis, the problem of dental clinics and dental inspection of public schools for the poor has practically been solved, and for its solution we can thank Dr. Lederle and his able assistants, Dr. Baker, of the "child hygiene" department, and Dr. Cronin, who has been an enthusiast over this subject for a good many years.

The situation in the hospitals in New York remains satisfactory. The appointing of an interne in Bellevue has not only formed a very happy couclusion to an interesting experiment; having somebody there to attend to all kinds of emergencies has enabled us to double and treble our work, and has put the department upon a basis where it can be readily kept up to a standard of efficiency equal to any other department of the hospital. It has worked out very satisfactorily to all concerned. The men that are appointed on the staff on the same basis as the physicians serve fairly regularly, and in any work that they start or are interested in, they have the interne there to assist and carry it on.

STATISTICS GATHERED IN A PUBLIC SCHOOL OF NEW YORK CITY.

I wish to give some few figures which have never yet been published. We have read a great deal about the conditions of the mouths and teeth of the public school children in our cities. Statements concerning the condition of the mouths and teeth of several hundred thousand children have been published in New York, but I have more than once called attention to the fact that these examinations were made by physicians, and, without wishing to reflect upon these physicians, I have maintained and still maintain that there was no great certainty as to the value of their statistics. Under permit of the New York board of education, the members of which are greatly interested in this subject, Dr. Maxwell, our superintendent of schools, being especially awake to the situation, twelve schools were set apart, with an attendance of 31,000 children, and the dentists, under proper regulation, were permitted to visit these schools and make examinations at any time suiting their convenience, the only requirement being that they shall notify the principal sufficiently in advance so that the latter can have the cards made out by the teacher in the room where the children are to be examined, and render such clerical assistance as will facilitate the work. Up to date two schools have been examined, with an attendance of about 4000 children, and I will give the results of the one school that has been tabulated; of the second school I have not the figures at my command as yet.

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* Since writing the above the appropriation, which had been made by the board of estimate and apportionment, has been set aside by the board of aldermen, due to a political quarrel.

The school in question has an attendance of about 2000 children, of whom 1991 were examined. Out of the cards bearing the records of these cases, 101 were thrown out because of certain defects, leaving a total number of 1890 tabulated cards. This school represents eight grades, from grade one to grade eight. It would take too long to give the rating of these various grades; we rated them as good, fair, and bad. Of course, that is a matter of personal judgment, but the men who made these examinations were dentists of standing and enthusiasts over this subject, so I think it is fair to say that they were rather inclined to make the cases out quite as bad as they were. Out of the 1890 children in this school whose examinations are recorded, 709 were rated as good, this is about 37½ per cent.; 834 were rated as fair, this is about 43 per cent.; 347 were rated as bad, being 19 per cent., or thereabouts.

Acknowledging that the cases rated as fair all have cavities in their teeth, and varied between what some might consider as bad and some as good, a little over 62 per cent. of the children in this school would range from bad to fair, while between 37 and 38 per cent. would range as good, which gives rather a larger proportion of those rated as good than we have been accustomed to expect. The condition of the gums was also noted, and here again the figures are astonishingly similar. While there are 709 children in whom the condition of the teeth was considered good, there are 731 in whom the conditions of the gums were considered good, 806 in whom they were considered fair, and 353 in whom they were considered bad. In other words, there were about 63 per cent. with probably infective conditions in the mouth, and about 37 per cent. that were considered good.

Of these 1890 children 38 per cent. had malposition of the teeth, while in nearly 62 per cent., viz, 1169, the teeth were not malposed. The interesting feature about these findings is that those who reported that they used a tooth-brush, viz, 1137 children, numbered about the same as those who had no malposition; those who reported that they never used a tooth-brush, viz, 753, or about 38 per cent., numbered just the same as those who had malposed teeth.

On the other hand, when we come to judge these mouths by the cavities present, the conditions assume a different aspect. Out of the 1890 children examined, 335 had no cavities at all, or 18 per cent. This leaves 82 per cent. with one or more cavities. 204 had one cavity only, 235 had two cavities only, so that those who were rated as good seem to coincide very nearly with those who had one or two cavities only. This leaves about 60 per cent. of the children examined with three cavities or more in the teeth. 232 had three cavities, 221 had four cavities, 151 had five cavities, and 512 had six cavities and over.

As will be seen, the difficulty of the problem of obtaining a correct estimate of oral conditions lies in the following: The examiners were dentists, intelligent, educated, enthusiastic, and yet upon a careful examination they practically rated the children's teeth that had no cavities, or one or two cavities, as in good condition. And that I think is quite possible; these teeth probably were in good condition. There may be only one cavity or two or three or more in a patient's teeth that are so small and insignificant that one could hardly rate them as bad. But granting that these children's teeth were "good," we still have 60 per cent. with three cavities or more. There are 750,000 school children in New York city. The school examined is considered an exceptionally good school, the children coming from high-class families, as is evinced by the fact that 62 per cent. of them are in the habit of using a tooth-brush, and yet we found this tremendous number of cavities.

I doubt if the number of cavities is an important question, after all. The question of the general condition of the mouth, whether it is filthy or clean, is the important one in my opinion. We all know that a perfectly clean mouth may contain carious teeth. It has been demonstrated by all of the investigators that the débris from cellular disintegration in the mouth of itself furnishes sufficient pabulum for the development and growth of micro-organisms that are destructive to the human teeth. Professor Gies of Columbia University has declared, in a recent paper which will soon be published, that the mucin of the saliva alone contains all the ingredients necessary for the development and growth of the micro-organisms that produce conditions resulting in the destruction and decay of the human teeth.

In view of all these facts, the most favorable result that, as far as I know, we have been able to obtain as yet, is that there can be no longer any question in our minds as to the necessity of a more vigorous warfare in the interests of dental and oral hygiene. If we wish more definite results, how shall we obtain them? Theories, if they are to be of any value, must be based upon practical experience; and practical experience surely cannot be gained by dreaming dreams and ignoring active work. Such work can be done only in dental clinics, such as have already been established, and by conscientious workers in the sweat of their brow, in any room obtainable, in hospitals, and in schools. It is only upon the wisdom gained by such active pioneer work that a substantial superstructure can be reared.

[See also *Discussion*, as reported under "Proceedings of Societies," this issue.]

AUTOGENOUS VACCINE TREATMENT OF A CASE OF ADVANCED PYORRHEA ALVEOLARIS.

By **J. A. PERKINS**, D.D.S., and **R. L. JONES**, M.D., Nashville, Tenn.

THE patient, a man of fifty-three years, before presenting himself for treatment had been able to take only liquid food for five weeks. In the maxilla fourteen, and in the mandible twelve teeth were present. Two of the lower teeth, a bicuspid and a molar, protruded buccally, and were so loose that they could be extracted with the fingers. They proved to be pulpless, and it was suspected that all the other teeth contained mummified pulps. No caries was present. The gums had receded to half the length of the roots, and were hypertrophied, pus flowing freely from around each tooth. The attachments of the teeth were very loose, embracing scarcely one-half of the apical third.

TREATMENT.

Pus was taken for culture purposes on February 2, 1912, and while the culture was being grown, local treatment and scaling was instituted. On February 10th, the first injection was made in the left arm. On February 24th, a second injection was administered in the left shoulder, the patient subsequently complaining of severe pain on that side. The third injection was made in the right shoulder on March 3d, severe pain being experienced on this side for about three days.

On February 9th no soreness remained in the mouth, the gums closing tightly around the roots of the teeth, and exhibiting a healthy pink color. The patient was able to eat anything he desired. Some of the teeth, especially the central and lateral incisors, were not entirely tight, owing to the great lack of peridental attachment.

Although the local treatment instituted before injecting the serum was followed by marked improvement, it had been thought necessary at first to place bands on the lower centrals and laterals, about one-sixteenth of an inch in width, and to tie them to the canine on either side after inserting small posts on the lingual surface.

PREPARATION AND INJECTION OF THE SERUM.

Pus was collected from around the root of the upper right canine for the purpose of preparing an autogenous vaccine. The gum around this tooth was carefully sponged off in order to get rid of the ordinary oral micro-organisms as far as possible, and pus was expressed from around the root of the tooth. From this pus, plants were made, resulting in an almost pure culture of the streptococcus. The organisms were grown on bouillon-agar for the vaccine after identification. It grew in short chains, was Gram-positive, as this organism usually is, coagulated milk, and exhibited the characteristic, small, white, round colonies on blood serum. This was regarded as sufficient to identify the organism, and its virulence was therefore not tested in animals. As to other organisms, there were only a few colonies on the agar plate, and these had the appearance of saprophytic organisms. As it was thought that the streptococcus was sufficient to account for the pyorrhea, the other colonies were not cultivated. After the streptococcus vaccine had been prepared, on February 10th, a small dose of only two million was given, in order to ascertain if any reaction to the vaccine would occur. The reaction was very decided, with slight fever, headache, pain in the back, and general malaise. These symptoms alarmed the patient somewhat, and no opportunity was offered to administer another dose until February 24th. This dose of twelve million was followed by a reaction similar to the first, though not so severe. The third dose was administered on March 3d, twenty million being injected.

OPERATIVE DENTISTRY NOT DEGENERATING: AN ANSWER TO DR. JAS. TRUMAN.

By E. M. AGOSTINI, D.D.S., New York, N. Y.

IT may seem almost irreverent for a young and inconspicuous member of the dental profession, as I judge myself to be, to raise a voice in protest against certain assertions made by Prof. Jas. Truman in his article which appeared in the April issue 1912 of the DENTAL COSMOS, entitled "Is Operative Dentistry Degenerating?"—so accustomed have we grown to accepting the dictum of some of our leading men as the final judgment to be passed upon the subjects which they discuss.

In order to set the reader's mind at rest in this particular, I will clear my position briefly from the start.

I am in perfect unison with the writer's treatment of the question of "extension for prevention," in which, by attacking this dental doctrine as preached and practiced by many of its more radical sponsors—notably among them Dr. W. R. Clack of Iowa—he seems to pursue that golden middle path which is always most praiseworthy, and which is usually pursued by those whom we may term conservative progressives. This subject is treated thoroughly and convincingly by Professor Truman, and his article as a whole—as is anything coming from him—is most inspiring, elucidative, and instructive.

The section, however, which bears the same heading as that of his article is the one which has aroused me and with which I am mainly concerned in writing these lines.

DR. TRUMAN'S ATTACK ON THE CAST GOLD INLAY.

After commenting unfavorably upon the fact that the meeting of the Chicago Dental Society had, out of the ninety-six clinicians on its program, announced only three devoted to the gold filling, while as many as eleven were to take up the gold inlay, he thrashes what he calls the objectionable trait of the American mental make-up—"an insatiable desire for something new and easy"—and continues:

"Castings of inlays are apt to draw away from the mold, and when placed in the cavity have quite wide margins—wide microscopically—that must be dealt with; and further, the gold casting has no retentive power." He then states that the cement upon which it depends for its retention being inevitably washed away, disintegration, caries, and dislodgment necessarily follow. He seems to give the impression that the inlay is not a stable filling, and concludes: "Theoretically, therefore, no inlay, no matter of what it is composed, can be permanent."

These broad statements mean practically a condemnation by Professor Truman of the cast gold inlay. Startling as this may seem, it merely throws light once more upon the practice too prevalent among some of the older members of our profession, of assailing systematically, often without serious consideration, modern methods of dental technique and procedure in a dogmatic fashion.

Time and again the gold inlay has been the victim of these attacks. This is probably due in part to the fact that so many of our younger element have so utterly failed to grasp its actual merits. In their eager endeavor to resort to what appears a simpler method of restoring teeth, they have thrust aside altogether their gold pluggers and inserted inlays at all hazards and under all conditions, paying no heed to the fundamental principles of cavity preparation, especially as refers to convenience, resistance, and retention forms, which factors are of such vital importance to the success of any tooth-restoring material, and have then trusted to cement to perform the painful and well-nigh impossible duty of covering a multitude of errors.

REFUTATION BY MEANS OF HIS OWN STATEMENTS.

In the face of this situation, and although realizing its damaging effects upon the status of this new procedure, I believe that Professor Truman, in flatly condemning the inlay as a permanent tooth restorer, has, unfortunately, suddenly fallen back from his position of a true progressive into that of an ultra-conservative. By analyzing some of his own statements, the reader will be enlightened on this point.

In a paragraph of the article in question previous to the ones already quoted, in speaking of extension for prevention, the writer remarks that the fact that *fillings* thus made—meaning fully extended—resist caries for years is not so much due to the margin being carried to immune areas as to the fact that, in these instances, they are made by old methods of careful operating, whereby the line of division between enamel and filling is nearly eliminated; he admits, however, that under all conditions "the microscopic line remains a permanent danger."

By this statement the writer frankly and candidly places the gold filling precisely on a par with the inlay.

GENERAL CONSIDERATIONS.

I believe that the method of procedure preliminary to the insertion of a gold inlay rests on the same basis as that for the insertion of a gold filling. The preparation of the cavity for either is essentially on the same general principles, namely, those laid down by Dr. G. V. Black and now generally accepted and sanctioned by the dental profession.

I believe also that the cast gold inlay as preached and practiced by Dr. Taggart is a mechanical contrivance suitable for accomplishing definite and accurate results whenever and wherever definite rules are followed accurately. By this I mean that, if proper attention is paid to the correct technique in this method of tooth restoration, the unfortunate gap at the margin so frequently seen will be almost always eliminated.

The microscopic line, as Dr. Truman asserts, will of course always, or at least often, remain a permanent danger. But is not this also true of the foil filling? The only difference is that in the former this line will be protected by a microscopic layer of cement, whereas in the latter it will be at the mercy of and sooner fall a prey to the ravages of microorganisms.

CONCLUSIONS.

Since, therefore, both the inlay and the filling are subject to the same weakness, all other conditions being equal, the inlay should theoretically be considered as superior. Since, moreover, the inlay has a wider range of adaptability, notably in large restorations with frail walls, and requires less labor in its construction, it follows that it is not only theoretically but also practically the superior.

Having thus made an effort to present the cast gold inlay in what I believe to be its true aspect, it not being my intention to enter into a lengthy discussion of details, I shall merely state in closing that the above conclusions are neither based upon a sudden outburst of enthusiasm nor upon observation of the work of others merely, but mainly upon the most trying personal experiences. Trial after trial, failure after failure—to the point of renunciation—the sacrifice of an immense amount of time, energy, and painstaking effort, were the elements which taught me that the cast gold inlay is a positive proposition, and that it has come to stay. And in the end it triumphed.

Hardly could one entertain the least doubt that, were Dr. Truman to lay aside his pluggers for a few moments, and also a certain prejudice founded upon sentiment and tradition, and apply himself diligently in an endeavor to grasp the possibilities of this modern method of saving teeth, he would readily realize that the foil method is not the only one that will stand the test. Happy are those gifted natures like his own who, with but a few masterly strokes of their able hands, can often accomplish what we poor less-gifted ones need months and sometimes years to acquire.

I am sure, should Dr. Truman condescend to take the advice of a novice, he will speedily come to the same conclusions himself regarding this much-agitated question.

Perhaps his vision will then be no longer haunted by the shades of Townsend, Arthur, Varney, and Webb, of glorious memory, as well as other noted foil-workers of the past. For, after all, were these men living today, I venture to presume that they would be rendering humanity as valuable services with cast inlays as they did with the older methods, thus using to the greatest advantage Dr. Taggart's wonderful achievement.

HOW SHALL THE PROFESSION MEET ITS NEW OBLIGATIONS RESULTING FROM ITS PROPAGANDA FOR POPULAR EDUCATION IN ORAL HYGIENE AND PREVENTIVE DENTISTRY?

By **N. S. HOFF, D.D.S., Ann Arbor, Mich.**

(Read before the forty-third annual union meeting of the Seventh and Eighth District Dental Societies of the State of New York, Buffalo, N. Y., November 9, 1911.)

WHEN invited by the Program Committee of this society to read a paper, I consented because I wanted to present my theme where I could be assured of a thorough and intelligent discussion of that which has appeared to me to involve a threatening obstacle and possibly a disastrous outcome of the great work so successfully inaugurated by the Rochester dentists, and which I have endeavored to state as tersely as I could in the title given to this paper.

INCREASED DEMAND FOR DENTAL SERVICE.

To many this may not appear a question of serious importance, as they may not have realized the increased demand for dentistry that recent agitations for better dental health have created. Every practitioner knows that his individual practice keeps him busy; and he probably believes this to be the result of his better business methods or a growing conviction in the minds of the people in his community that he is worthy of their confidence; or he may with more modesty think the times are growing better, and that the people have more money to spend for such luxuries as dentistry. A considerable agitation for better business methods in the practice of our profession has been carried on in some of the journals, most of which, we are free to say, is of doubtful ethical propriety, or even of doubtful commercial value. We are, however, confident that these are not the real reasons for the general awakening of the public to the fact that the teeth are more essential to health and happiness than had heretofore been supposed.

Occupying a position which necessarily brings me into contact with this trend of events in our profession, I am forced to believe that there is an ever-increasing demand for better dental services not in just one, but in every department of our calling, particularly in the conservative or what is now called the preventive department. In evidence of this assertion, I now receive more frequently than ever before, applications for dentists in unsupplied places; for assistants in offices, particularly for prophylactic specialists; for orthodontists, and even for instructors in dental colleges—so much so that there is no good reason today why any properly equipped dentist should not readily find a fruitful and profitable place for work.

THE RECOGNITION OF PREVENTIVE DENTISTRY.

It would be interesting, but difficult, for us to say just where the idea of preventive dentistry was born, or to whom, if to any one person, the credit belongs. Historically, reparative dentistry came first; then conservative dentistry for a long time seems to have met all demands made upon us by the public. In these later days of agitation for all sorts of progressive ideas, preventive medicine and preventive dentistry seem to be the most insistent factors in the problem of better health for our bodies, and especially for our teeth. At all events the demand is here, and it has brought with it the problem of how to cope satisfactorily with one of the most prevalent scourges of mankind, viz, diseases of the teeth and the peridental tissues. Our past endeavors seem to have been largely directed toward prosthetic or reparative treatment, and the curriculum of our training schools still largely tends to develop artizans rather than scientists. In fact, the dental college that can make the strongest statement as to the equipment for technical training and can boast of the largest amount of clinical material attracts the largest number of students. I need not pursue this thought farther in order to call to your minds almost innumerable facts which will convince the most skeptical that it is the repair or technical phase in dental practice today that constitutes the popular estimate of our professional ideals and standards. We have been looked upon with favor because of our reconstructive achievements rather than for our healing or preventive endeavors, and we alone are familiar with the great scientific facts that have come to light through the earnest researches of our own workers, which have not only strengthened our own technical endeavors, but have shed new light on some general healing problems. I trust some of the *confrères* present who through their unselfish efforts have been active in pushing the great philanthropic work of preventing caries by arousing the masses of the people to a proper appreciation of the worth of their teeth, will bring out in the discussion their ideas as to how we shall enlarge our capacities in view of the extra practice which will unquestionably come to us because of this insistent policy of educating the masses in dental hygiene.

INADEQUATE NUMBER OF DENTAL PRACTITIONERS.

The common opinion that all callings, except that of domestic science perhaps, are overcrowded, is likely to be the answer of the average dentist to our question. But with a population of over ninety millions of people and only thirty thousand dentists to serve them, there is not likely to be much preventive work done, because so much needed repair service will be demanded. Where is the dentist who can serve, even in a relief way, his share—or three thousand patients? The average practice which is served with a fair degree of faithfulness does not number more than one-tenth of this average allotment, or about three hundred patients a year. And how many can the dentist properly serve if he is keeping up with the present-day standards of technical excellence and preventive ideals?

While it is true that a rigid application of oral prophylaxis diminishes the need for much prosthetic and operative restoration, its own application makes a tremendous encroachment on the time formerly given to repair processes. Experience so far teaches us that in an average practice oral prophylaxis cannot be applied to all patients with the desired results. There will probably for a long time be a demand for much repair; but unfortunately for us, when rigid oral prophylaxis is instituted, the standard of technical excellence is of necessity so raised that more time must be given to its perfection, and consequently the dentist who undertakes to introduce this preventive treatment alone will find himself very soon so overwhelmed with work that he must for very self-protection begin to look out for relief. If he is conscientious, he immediately thinks to associate with himself some promising young man or woman graduate to assist him in caring for his ever-increasing practice, and anyone today undertaking to do this will find that the number of desirable unemployed graduates and legalized dentists is very small. Many are surprised at this, and begin to blame the colleges because they do not graduate suitable men to take such places, never thinking that the best men from the colleges do not need to associate themselves with another dentist to secure a practice.

It may not be generally known, but it is a fact that the dental colleges in this country are not graduating as many students as they did in any of the years from 1897 to 1905. The average for the last six years has been a little over 1650, while the average for the preceding six years was about six hundred more, or 2250. When we reckon the more frequent losses from death and retirement in various ways, we can easily see why it is so difficult for us to secure competent assistants from this source. Consequently we discover why earnest practitioners, who see clearly their duty to their patients, have almost exhausted their resources in devising some scheme by which some part of their practice may be transferred to others. The specialty of orthodontia is engaging a rapidly increasing number of practitioners who are devoting themselves wholly to it, and the general practitioner is referring this part of his practice to these specialists. Many dentists have given up all kinds of prosthetic work, or, if they undertake it at all, they only take impressions, which they refer to the commercial laboratory for constructive details; many will not extract teeth, and refer all surgical work to the specialist in this line.

These facts seem to point to the fact that our practice is becoming too complex and exacting for the most versatile and industrious dentist. The advent of oral prophylaxis seems to have brought with it a decided conviction that either a new specialty must be developed or that the general practitioner should administer it along with his usual practice. Many have tried to do this and because of the extra burdens imposed have either done the work inadequately or have come to the conclusion that they must put a competent assistant or associate into the office to take proper care of this department. Owing to the fact above cited, viz, that the annual supply of college graduates available for this purpose is so inadequate, earnest advocates of the work have proposed various schemes to supply the demand.

THE TRAINED DENTAL NURSE, AND THE ARGUMENTS FOR AND AGAINST.

Dr. M. L. Rhein is entitled to the credit of suggesting what he has termed the "trained dental nurse." Briefly, Dr. Rhein's suggestion, first made before the Stomatological Section of the American Medical Association in May 1903, contemplates the training of women for prophylactic treatments—much as the medical nurses are trained in medical hospitals —in special schools established for this purpose, or the adding of a curriculum for the training of dental nurses to that for medical nurses. His argument is that women can be taught to do this work adequately and more skilfully than men, and that they would accept fees that the masses could pay. They would also remain permanently and loyally in one's practice, whereas a man graduate would in a year or two want to dissolve his relationship to engage in practice for himself, thus necessitating the frequent breaking-in of new assistants. He believes that such nurses should have a certain legal sanction and should never be permitted to practice except in a dental office, under the immediate supervision of a legalized practitioner. This would, in the author's judgment, secure for the masses preventive treatment at reasonable cost, be a material relief to the busy and overworked dentist, and incidentally furnish a new vocation for women.

Dr. C. M. Wright of Cincinnati suggests a similar functionary whom he calls a "denticure" or "subspecialist." In the *Dentist's Magazine* for February 1906 he outlines a special course of study to be given by dental colleges for the training of women to do this work, stating details regarding the content of the curriculum for an eight months' course of study and technical training. It would be interesting had we the time or space to quote and comment on this curriculum, as this would give us a better conception of Dr. Wright's idea. It includes a limited number of lectures on the general or fundamental sciences on which the dental curriculum is now based, and calls for a special training in the technical work required for prophylaxis in place of the general technical and clinical features of a regulation dental course. Such a training would unquestionably, he thinks, fit such graduates for the special practice required better than the usual and broader technical and clinical courses now given by the colleges. Dr. Wright's idea is that the "denticure" should be in no sense a dental surgeon or therapeutist, but only a promoter of oral hygiene by the usual preventive or prophylactic agencies, such as thorough scaling and polishing of all exposed portions of the tooth crowns and roots. He maintains that this is a necessary work for someone, and that the busy dentist has no time for it. He concludes that, as physicians have trained nurses to help them, why should not dentists also have helpers?—as every conservative practitioner needs someone capable of doing this work for him, in order that he may use his time and strength for the more important surgical and therapeutic services.

Dr. A. C. Fones of Bridgeport, Conn., read a paper* at the recent annual meeting of the National Dental Association at Cleveland, in which he advocated the training of office assistants by the dentist to do a part of the prophylactic work that he finds consumes too much of his time; and this, he thinks, can be as well done by an intelligent woman properly trained for the purpose. His ideas I quote, briefly abstracted: After restoring to normal condition a patient's teeth and mouth, what can we offer him that will prevent recurrence, at a reasonable and practicable outlay? The vast majority of dentists have no appreciation of the preventive value of oral prophylaxis, because they have not personally experienced it. The establishment of good professional oral prophylaxis in any practice will eliminate eighty per cent. of the repair work. The time known to be necessary for this is not available to the dentist today, and must be delegated to a professional associate or trained assistant. A woman assistant is most likely to be capable and dependable; but the training of such a woman to do the work, and the patients to submit to it, constitute the problem which confronts everyone who attempts to practice preventive dentistry. The individually trained assistant, even when a graduate dentist, is now necessary. Dr. Fones suggests three sources of future supply: First, chair assistants; second, medical nurses; third, school nurses. These he would have further trained by the dentist in the study of the anatomy of the tooth and its environment from books and pictures. A set of extracted teeth should be inked over, and the assistant be asked to remove the stain with proper polishing materials, with repeated stainings and repolishings, until the work can be satisfactorily done. The assistant should then be made patient, and should watch the treatment of her own mouth in a hand mirror, learning hand-rests, direction of force applied, etc. Then the assistant should polish the dentist's teeth, who, with a hand mirror, should direct the operation and criticize when necessary. Then a patient should be treated before her, and she will then be prepared to treat simple cases under close surveillance. She should next be taught to scale away calcular deposits, first slight, afterward more difficult ones. For seven years such a trained assistant has been doing very satisfactory work in Dr. Fones' office. A trained medical nurse would have a certain amount of advanced credit to build on, and her time of training should be materially shortened. Dental assistants could be trained in public-school clinics by trained graduates, who could direct their work, and after a few years of practice they would make good general office assistants. They should have the advantage of reading and studying in colleges and hospitals, and of lectures given by medical and dental men interested in preventive treatment. Some states sanction by law such trained assistants, and other states could arrange to legalize them. All patients should pass under the dentist's inspection at least twice a year.

Dr. Grace Rogers Spalding, the well-known specialists and writer on oral prophylaxis, takes issue with the "trained nurse" and "denticure" suggestions, in a paper published in the *Dentist's Magazine* of June 1906. She is decidedly favorable to the idea of only college graduates taking up this work, after having obtained post-graduate training in this specialty. We quote briefly from her article:

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* "The Necessity for and Training of a Prophylactic Assistant," DENTAL COSMOS, March 1912, p. 284.

> The dental nurse as suggested by Dr. Rhein does not exist, and never can, because she would be incompetent to do the actual work, and could never gain the confidence of patients, so necessary to enforce the ordinary rules of the oral toilet which are essential to successful results.
>
> There are few dentists who sufficiently realize the importance of oral prophylaxis to be willing to master its technique, and they believe it useless to endeavor to comprehend its scope; therefore they could never properly train an assistant in the technique nor inspire such a one with the spirit of enthusiasm so essential to its promotion. The practitioner of oral prophylaxis should be broadly educated in sanitary science, and never the "assistant" or "denticure" in the office, but the associate of the dentist, as close co-operation is required in service to almost every patient in the practice, a sympathy impossible where a common knowledge is lacking.
>
> The work is tedious and irksome to one who has no proper conception of its importance, which will probably be the case with the denticure or nurse, who will therefore become tired and inefficient, or at least be lacking in enthusiasm. No graduate dentist who has taken up oral prophylaxis seriously will belittle its importance, nor has such a one ever abandoned it because it was tedious and only fit work for an uneducated assistant.
>
> The trained nurse is only another experiment, and will prove unsatisfactory in the end. The work is vitally important and requires a complete dental training to begin with, and a subsequent special training for its highest development and successful practice.

Other writers have made suggestions, but we believe those quoted will fairly represent the attitude of the profession on this problem so far as it has been made public. It is clearly apparent that no definite solution is practicable at this time, but it seems that necessarily some action will have to be taken very soon, or the agitation for better tooth health will be of small advantage to anyone, and a fine opportunity for professional advancement and humanitarian service will have been lost.

It is characteristic of the American that when he knows what ought to be done he will find a way to accomplish it. If Professor Miller had lived to complete his research on the oral toilet, and if he and others had succeeded in finding in the saliva a chemical restraining influence on dental caries, we should have more scientific data to work upon, and possibly the tediousness of the present prophylactic technique might be somewhat relieved. But up to this time nothing has been given us that can be transposed into technical or therapeutic efficiency, and therefore we shall have to fall back on our skill and our general knowledge until we become wiser.

COURSES FOR TRAINING GENERAL OFFICE ASSISTANTS.

We seem to have reached the conclusion that oral prophylaxis, as we at present know and practice it, is successful as a preventive measure, though largely as a technical ministration; and we are in doubt, or perhaps divided, as to who shall administer it, the professionally trained or the technically trained. The trend of our arguments seems to be that the work needed is so vast and universal that an educated profession cannot hope to cope with it creditably alone, or, if at all, at such cost that the masses of the people would necessarily be deprived of its benefits. It is the old question of the ideal or the practicable. Shall we compromise ideals which we confidently approve, in order that we may receive temporary advantages? The suggestions already quoted favoring non-professional assistants and the fact that at least three dental colleges have already announced courses of instruction for dental assistants would seem to indicate that the non-professional assistant is to be tested out first. Judging from the announcements already issued, it is clearly evident that the training is to be only superficial, and it is to be feared that the results will be somewhat problematic.

Let us see what one of the colleges

proposes to teach in the course announced for training a general office assistant. The course will run concurrently with the regular college course for eight months. A good general school education with no definite grade of attainment is required for admission. The course is to be given by the several members of the faculty. In anatomy, the study will be such as is given in the first eleven chapters of Broomell and Fischelis' Anatomy, which covers the surface anatomy of the bones of the face, teeth, etc., but does not include what is absolutely necessary to the practitioner of oral prophylaxis, the embryology and histology of the developing teeth, gums, and peridental structures. A course embracing a study of the filling materials and the use and care of operative instruments and appliances, a course in anesthetics, their nature and use, care of patients, and care of surgical instruments, is outlined. Oral prophylaxis, including the removal of deposits, polishing teeth, preparation of oral antiseptic and toilet preparations, dental medicine, nature and use of the various drug remedies used in dental practice, bookkeeping and office management, assistance in various prosthetic procedures, clinical training in the operatory, as actual assistants to demonstrators and students in every kind of operation; sterilization of instruments, orthodontia and porcelain operations, crown and bridge work, casting inlays, prophylaxis, etc., are offered. A suitable certificate but no diploma will be issued on completion of the course. It is not contemplated that the course shall lead to a degree, nor that a person holding the certificate shall have legal standing, nor in practicing shall infringe the state laws in any way by undertaking to do any part of the regular practice of a dentist.

CRITICISM OF THE PROPOSED LEGALIZATION OF GENERAL OFFICE ASSISTANTS.

We have neither the time nor inclination to criticize this curriculum, and besides, we are not sure that we understand what the school in question is endeavoring to do. If it is to educate an office woman who shall be useful as an ordinary chair assistant, then no doubt this course will serve as a very successful preparation indeed; but if such training is intended to equip for administering preventive dentistry, as we think of it, then, in our judgment, it is wholly insufficient. Of what use would be a knowledge of the surface anatomy of the teeth without the further knowledge of their environment and the diseases to which they are liable, even though one should only attempt to remove deposits and polish exposed surfaces? And why study the nature of dental drugs, anesthetics, etc., if one cannot legally use them?

The trained medical nurse, perhaps, corresponds more nearly with the trained dental nurse which the college whose curriculum we have briefly outlined above has in mind to educate; but we should not forget that the trained medical nurse of today is more thoroughly trained for her work than the dental nurse would be under the above course of study, however well it may be taught. The medical nurse of today must possess a good education to begin with, and she must devote at least three years of twelve months each to constant study and hospital experience, and must pass examinations on her various studies before she can receive her certificate, which gives her a legal standing, not to practice medicine or any part of it, but only to see that the physician's orders are executed. It is true that nurses who are legally qualified may administer "first aids" when the physician is not present and an emergency requires it, but they are never expected to perform even a minor surgical operation, or initiate any medical treatment—except possibly a hypodermic injection or a stimulant of well-known and limited power—unless the physician is directly supervising it.

We can probably—of course, with similarly restricted functions—legalize trained dental nurses, who could safely cleanse the surfaces of the teeth from calcular and other extraneous deposits in healthy mouths without much risk of infection or other injury. But this is only a very small part of the field of oral prophylaxis, which has a rescue as well as a preventive function that no trained nurse of the character indicated should undertake to deal with any more than the medical nurse should undertake the amputation of a limb or an appendectomy. We cannot favor the suggestion of Dr. Fones that there are three sources from which we can recruit the dental prophylactic assistant—namely, the chair assistant, the trained medical nurse, and the school-trained assistant—because we fail to see how it will be possible to endow any of these persons with the requisite knowledge and skill by any short course of office training, or by a year of college work. The fundamental facts would need to be learned and the technical skill developed just the same, except perhaps that the mental conceptions would probably be more easily grasped because of the larger association with similar ministrations in medicine. Moreover, how could we ever give a legal standing to such persons, to keep whom within the limits of their proper functions would probably be a continual source of trouble? Would not the advertising quacks use this open door to fill their offices with unskilled and unlettered employees, with greater injury to the people and to the utter confusion of our professional standards? I have seriously considered this proposition from all sides, and am as anxious for its prompt solution as anyone can be, but I fear it will never materialize satisfactorily from these suggestions.

SPECIALIZING IN ORAL PROPHYLAXIS BY DENTAL PRACTITIONERS.

Since I have apparently rejected all the other propositions advocated, it is probably no more than right to expect from me a more feasible and satisfactory plan for meeting this problem. I am free to say, however, that I have little to propose that is new or original; but I hope to draw your attention to what in the past has proved to be a truly pedagogic and conservative, if it is not as progressive a method of developing safe and reliable professional men in all callings. The self- or partially educated theologian is likely to be narrow and fanatical, and the results of his efforts are usually transient or unfruitful; the self-made lawyer is likely to be the demagog and ward politician; in medicine there is the quack, a nuisance and a menace to public health. Shall we be more fortunate with a large contingent of imperfectly educated or partially trained and therefore unskilled dental nurses, over whom we can have but little legal or professional control? Is the demand so imperative that we are willing to start this work—which we all recognize as the most important ideal that our profession has ever espoused—with a conception of knowledge and skill involved which is no greater than was known a century ago in our profession. In fact, Fauchard published a work on dental surgery in 1728 in which he advocated the use of a marshmallow root with powder for cleansing the teeth from extraneous deposits, and he intimates that for the ordinary brushing of teeth toothbrushes made of horsehair were in use by the people long before his time. It would seem that we should have made some progress in definite scientific knowledge since then, indicating a broader conception of preventive dentistry than was known two hundred years ago.

I cannot here take time, even if I were wise enough, to enumerate all the important conditions that will be met in the ordinary daily contact with various patients, which an educated mind would detect but which a tooth-polisher would overlook entirely. The nurse might be taught that dental caries is generally found on particular surfaces of certain teeth, and that certain conditions of malposition of the teeth favor bacterial activities, and that she should be most careful to polish all such surfaces with extra care, but would such instructions establish mental alertness to detect similar tendencies in unusual situations or peculiar environments? I fully realize that anyone with average intelligence and proper training could tell the difference between clean and unclean teeth, normal gum tissue and congested or diseased gums, but could he have any such correct conception of the cause or even the actual conditions as would induce him to vary the treatment from the usual scaling and polishing? I have frequently observed clinicians and students in the college clinic who were giving the regulation scaling and polishing treatment to patients with acute infectious or ulcerative stomatitis, or with some acute symptomatic expression of a grave systemic disorder, as hemophilia, or the sequelæ of an eruptive or typhoid fever, tuberculosis, syphilis, and chronic nephritis, in which conditions the danger of infection from local trauma is very great. It is indeed fortunate for us that infection of the oral tissues is difficult, owing to the high sterilizing influence of the oral secretions, else the carelessness of the average dentist would work more harm than all his repair work would make good.

From this brief statement, which I might elaborate and render more impressive, you may conclude that trained specialists for this work, in spite of the fact that it will take time to supply the large demand and also in spite of the other fact that the masses may not soon receive the benefits desired, make my scheme practicable.

I am so thoroughly convinced of the value of oral prophylaxis that, if I were a young man, I most certainly should adopt it as a specialty; and with my present knowledge and experience, were I today free from my present obligations, I should take up this work in preference to a general practice. If I had the power, I should today introduce this as the chief work of every dental office in the United States and make the repair work secondary or delegate it to the "trained mechanic." I know, of course, that this is no solution of this problem, as it is too radical and revolutionary, and might prove as disastrous for our profession as it might be for the United States government to adopt a policy of absolutely free trade. But it will be necessary for the dental profession at least to awaken to this call to a higher order of service, if it is to keep pace with the trend of modern scientific medicine and retain its place as a recognized profession. Prophylaxis is the order of the day, and we must face the issue squarely sooner or later, and the sooner we begin to agitate and work to this end, the faster we shall accumulate the momentum which shall carry us to success. It has for some time seemed to me that it would be much easier to convince the profession of the great value of this work and to enlist a large proportion of dentists in the actual practice of oral prophylaxis, than it would be to educate and inspire the newly graduated dentists with a conception of its importance, inducing them to engage in this work exclusively.

With this thought in mind I have written much, given clinics, and talked oral prophylaxis for the past four years, hoping that I might induce practitioners to give this work an important if not the leading place in their practices. I am forced, however, to confess that, while the value of the work seems to be gaining in favor constantly, conservatism and force of habit render it difficult for most practitioners to believe that they are under any obligation to take it up themselves, except by the aid of an employee, who thus serves as a sort of understudy to one who is unwilling to qualify to be an effective instructor by the only means now available—namely, personal experience. This constitutes my strongest argument against the denticure or office-trained nurse. The benefits to the patient will be measured by the knowledge, skill, and enthusiasm of the nurse, rather than by the broad knowledge, skill, and experience of the practitioner. If we could only convince the profession of the importance and dignity of this department of practice, it would not be long until our crowns, bridges, and inlays would be delegated to the expert mechanic, and the more vital therapeutic and prophylactic treatments would be our pleasure, and an inspiration for scientific research for fundamental facts, to form a basis for real scientific treatment. Then we should become more of the professional and less of the artizan.

While I am not ready to give up the hope that the profession will untimately and gradually take the position I have above indicated, I am convinced that time and education will be required to accomplish this end, and that in the meanwhile we may be compelled to resort to some form of temporization or expediency. As an individual I believe in erecting a target and aiming directly at the bull's-eye, but by experience I find that where many men of many minds are concerned it is difficult even to set an ideal target, and the variations in men's vision render it difficult to secure direct or even concerted firing.

In order that we may get this question clearly before us, it may be well to say that cleaning and polishing teeth is only one feature of oral hygiene; and while oral prophylactic treatment may include the cleaning and polishing of teeth, it is a very much broader and more comprehensive treatment, requiring a higher order of professional knowledge and skill, which carries a responsibility no less exacting than that demanded in other departments of practice. The developing of a specialty in dental practice on any narrow educational basis, such as the cleaning and polishing of teeth, is not likely to solve the problem of oral hygiene nor to advance our professional standards, and may lead to disastrous legal complications and ethical confusion.

We make this statement as the logical deduction from the premises set forth by those who have advocated the "dental nurse," the "denticure," and the office or college-trained "assistant," as also from the well-known premises assumed by all writers on the preventive value of oral prophylaxis and its exacting technical and scientific requirements.

As we see the matter we do not believe mere polishing of the crowns of teeth by unprofessional office assistants can be made a determining factor in preventive oral hygiene, because of their limitations in therapeutic ability. We consider it improbable that more than a small minority of women who would be willing to devote themselves to this field as a life-work will become sufficiently interested to investigate for themselves or to extend their work beyond that of the mere denticuring technique. Women who will do this work intelligently must have sufficient education to take a professional view of it, or they will become discouraged, or tire of it, and give it up on the slightest provocation, and unless they invest time and money enough to compel them to give it a serious trial, there is only a bare possibility that they will become so enamored of its dignity that they will be enthusiastic and successful practitioners. We must give them all possible latitude of endeavor, or we shall never enlist their earnest and faithful co-operation. Mere money-making will never cause a woman with a benevolent spirit to give herself to a life of technical drugery.

FULL DENTAL TRAINING FOR ORAL PROPHYLACTIC ASSISTANTS ADVOCATED.

My conclusion, therefore, is that, if woman, because of her more acute tactile sense, which is a most important technical element in this particular form of surgical treatment, is to take up this work, she should be most thoroughly equipped with a complete professional education that will enable her to enter unhesitatingly every department of oral hygiene and therapeutic treatment. I would have everyone who undertakes this work become first an educated dentist, rather than a trained nurse; with the exception, possibly, that those who expect to follow this particular line of practice should devote more time to the underlying scientific subjects and less to the usual technical subjects of our present college curriculum. In other words, our college curriculum should be revised so as to permit the student to select in his course certain studies which should qualify for definite specialization. This, of course, would have to be controlled by faculty advisement and supervision. If this is not practicable, an additional course of post-graduate work becomes necessary.

I realize that this proposition will meet with objections because of the time required and the probability that it will not meet the needs of the people who have no means of compensating professional oral hygienists. On the contrary, I contend that no class of people, rich or poor, can be properly and permanently served by inadequate means. This plan will require more time to get it into active operation, but it will serve so much better that results will inspire confidence in the minds of the people, and the educational problem will consequently be solved much more quickly. Above all, whatever is gained will be permanent, and the advantage to professional ideals will be immeasurably greater.

NECESSITY FOR RECRUITING DENTAL COLLEGE STUDENTS.

In conclusion, I want to add a few words as to a method of recruiting this new specialty. I am not taking this position as a promoter of dental education, or in the interest of the dental college. If anyone so interprets my remarks, however, I shall offer no objection, inasmuch as I am fully convinced that the dental college is not being supported and used by the profession today to its full capacity, to the great detriment of the cause of oral health. I have called attention to the fact that the colleges are graduating today six hundred students less than they did six years ago. The reason for this is not that more dentists are not needed, but that the colleges have made a desperate effort in the last five years to exact an appropriate preliminary education for admission, and have had to raise their tuition fees about one-third in order that they might equip themselves with facilities in the way of buildings and instructors to educate their students for the exacting requirements of modern dental practice. Students have no proper appreciation of this, and they take to callings involving less time and expense. I do not maintain that our colleges are doing all they should do to prepare their graduates for modern practice, but I sincerely believe that they are doing all they can do and live, and I fear that they are doing this without the cordial support of the profession, which support is not only desirable but absolutely essential to make their work successful. We all want our profession to rank with other learned callings; but this can be done only by a united and determined effort to make it learned and benevolent in its scientific and ministerial capacities. We need more well-educated men and women, and to get them legitimately the profession must change its attitude toward the colleges, and improve the quality as well as the number of students. How many men in this audience have, during the past year, given any thought or made the slightest effort to send a well-prepared student to the college of his choice? Is it not a fact that most of us do not feel called upon to increase the dental profession at all? It is most rarely that the dean receives a letter from a dentist commending a good student. As a consequence, the dental colleges are besieged with letters from men who cannot comply with their admission requirements, and many times a persistent candidate with insufficient equipment will work his way into college, and by similar tactics work his way through the college and examining board to a place in the world's work where he will either fail or fall into a perfunctory performance of his duties. We need a lot of new workers in this special field of dentistry, and I believe the colleges will do their part in preparing them, if the profession will supply the raw material, which, however, should not be too "raw." If the members of these two societies will take it upon themselves to get acquainted with the boys and girls in the senior classes of their respective high schools, select the brightest and best of them, and acquaint them with the opportunity offered in dentistry for humanitarian service of the grandest kind, I am confident that the dental colleges of New York state will not be criticized in the future for admitting improperly prepared students. I am also confident that in no other way could the profession accomplish so much so quickly and so well toward advancing the professional standards, or helping the cause of better oral health.

I make an appeal, therefore, for better and more broadly educated men and women, who shall enlist for life in a work that is as noble and dignified as any other that is accessible to serious-minded and benevolently inclined young men and women, and in which the compensations are reasonably adequate and the demand is practically unlimited. I believe it to be the one great obligation which rests upon the dental profession—to make known this opportunity to the young men and women who have no conception of a sphere of such great usefulness and opportunity.

CORRESPONDENCE.

PROPOSED REGIMEN IN "ALVEOLO-DENTAL ARTHRITIS."

To the Editor of the Dental Cosmos:

Sir,—May I make use of the columns of the Cosmos to address a request to those members of the profession who are inquiring into the etiology of disturbances of the alveolo-dental ligament—which, in an article published in this month's (June) issue of the Cosmos, I named "alveolo-dental arthritis"?

Would every such member of the profession (for the purpose of corroborating on a larger scale the result which I obtained in the limited number of cases under my observation) fall in line, and instruct such of their patients as have a tendency to the formation of large deposits of calculus, to undertake, during a period of from three to six months, the ingestion of a diet rich in lactic ferments? (*Yoghurt* is the richest natural milk product in lactic ferments; buttermilk and pot cheese contain lactic ferments, but in lesser quantity.) The amount of lactic-ferment-containing food to be ingested will have to be in direct proportion to the quantity of food to which they are accustomed. If they are large eaters they should take more of the yoghurt, buttermilk, etc., reducing in proportion the customary diet. One plate (representing about two liters of fermented milk) of yoghurt to three plates daily, and from two to four liters of buttermilk, will constitute the minimum and maximum of the needed pabulum.

In addition to this change of diet, there should be taken, twice weekly, a warm bath (35° Centigrade) of five minutes' duration, rubbing slightly, with an ordinary bath-tub scrubbing-brush, the entire body surface.

This simple physico-dietetic treatment gave the following result in the cases observed by me:

After removing as carefully and thoroughly as possible all detectable deposits—in the mouths of patients who usually would again form large deposits in less than sixty days, in spite of reasonable personal care—and then having them follow the above indications during three months, the deposit formed has been found to be very slight. Removing this slight deposit, and continuing the treatment for another period of three months, there has been found at the end of six months almost no formation of deposits; prolonged continuation of the treatment—in one case, closely observed, the treatment being followed regularly for about two years—has resulted in a complete absence of deposits.

In discontinuing the brush-baths (*Buerstenbaeder*) for two months, but keeping up the lactic-ferment-food addition to the diet, the deposits increased somewhat—not so much as originally, however; after discontinuing both the baths and the lactic ferment food, the deposits would accumulate as quickly and in as large quantities as before the treatment.

Departing from the supposition that formations of calculus, serumal as well as salivary—although not of similar origin, but, I believe, subject to the same influences as regards their formation—are due to auto-intoxication, and are in proportion to the amount of toxins formed, retained or eliminated, I profited by the information given out some years ago from the Metchnikoff laboratory, relating the beneficial result obtained from the ingestion of lactic ferments in combating intestinal putrefaction. These experiments in the Metchnikoff laboratory were prompted by the observation that Bulgarian peasants, who are the originators of yoghurt, and who consume large quantities of it, are as a rule exceedingly healthy and long-lived. I accordingly took to observing the effect of lactic ferment foods mixed with the habitual diet, upon the formation of deposits of calculus, obtaining the above described results.

The corroboration of the results of my observations seem to lead to the following conclusions:

(1) The formation of oral calculus is an arthritic manifestation due to auto-intoxication, resulting from intestinal fermentation.

(2) This calculus is of constitutional origin; it is the local irritating agent causing disturbances of the alveolo-dental ligament (commonly known as "pericementum," "peridental membrane," etc.), provoking a condition which, after passing through various stages, culminates in the pathological aspect more generally called pyorrhea alveolaris.

(3) The cause of these disturbances being of arthritic origin, and the end-organ attacked being the alveolo-dental ligament, may not the disease in all its stages be properly named "alveolo-dental arthritis?"

Before closing, I wish to be allowed to explain briefly my view of the physiological action of the indicated physico-dietetic treatment, showing the reason for recommending the baths in addition to the diet: The intake of lactic ferment foods counteracts directly the intestinal fermentation, acting on the principle of antitoxins; the brush-baths induce greater activity of the excretory glands. When this is accomplished, the opsonic index is raised and a general stagnation avoided which when it exists is responsible for the longer retention and increase of the products of putrefaction in the intestines. The proof of decrease or arrest of intestinal fermentation is shown in the decrease of the micro-organisms in the feces; at such times there is also a decrease of the micro-organisms of the mouth.

When intestinal fermentation is arrested there is no auto-intoxication present, arthritic manifestations are absent, and so also is that arthritic factor which attacks the alveolo-dental ligament—oral calculus—which in a large measure is, after all, nothing but a conglomeration of micro-organisms.

Respectfully,

ARTHUR ZENTLER.

NEW YORK, N. Y., June 8, 1912.

UNSANITARY REGULATING APPLIANCES.

TO THE EDITOR OF THE DENTAL COSMOS:

Sir,—You have upon several recent occasions commented upon the injurious effects of badly fitting gold crowns and bands upon the gum tissues, and in this connection I was suprised to find regulating bands permanently (?) attached to the teeth not mentioned by you.

If some crowns are "physical insults," what term would aptly describe the orthodontia bands referred to? These are usually attached to partly erupted teeth; there is no pretense to any fit about them, and they are crowded under the gum, at which place they naturally produce no little irritation. Then, from their very nature they harbor food, or rather débris, in quantities.

Then again, what about the loose wires (for they are naturally loose) which bind the teeth to expansion arches? These are frequently entirely embedded in the gums, and it would be hard to devise a more unsanitary contrivance in the mouth than the combination referred to.

Just as an example of the fact that the *common people* are "taking notice" today, I was recently consulted by a man one of whose children had been wearing such appliances for four years, and the end not yet in sight. He stated that he had heard that Riggs' disease could be caused by such regulating or rather orthodontic appliances, and upon my advice he would either continue or discontinue the work in question.

Now the question becomes, If ill-fitting bands have caused such havoc with mature teeth, is it because of their immaturity that the teeth of children are not likewise injured by the same causes?

I await your views with interest.

C. EDMUND KELLS, JR.

NEW ORLEANS, June 8, 1912.

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PROCEEDINGS OF SOCIETIES.

SEVENTH AND EIGHTH DISTRICT DENTAL SOCIETIES OF THE STATE OF NEW YORK.

Forty-third Annual Union Convention.

(Continued from page 714.)

FRIDAY—*Afternoon Session.*

The meeting was called to order at 3 o'clock Friday afternoon by Dr. Luther, who announced that the first order of business for the afternoon session would be a paper by Dr. HERBERT L. WHEELER, New York city, entitled "Ways and Means of Advancing the Cause of Mouth Hygiene in Such a Way as to Benefit the Public and the Profession."

[This paper is printed in full at page 767 of the present issue of the COSMOS.]

Discussion.

Dr. W. W. SMITH, Rochester. Dr. Wheeler speaks of his having served in a dental clinic in New York ten years ago. I can go him one better. I served in a dental *dispensary*—mark the difference in the terms—over twenty-five years ago in Rochester. Perhaps I should explain that this dispensary died a natural death two years after its establishment, while the clinic in which Dr. Wheeler served is still in existence. I agree most heartily with all that the essayist has said except one point, and that is nomenclature. I wish Dr. Wheeler and everyone here today, especially those *confrères* having charge of the programs for dental meetings, would look up the definition of the word clinic. In Rochester we considered the matter very carefully, and saw how inappropriate the name "clinic" was for the work we were doing, and decided to adopt the term "dispensary."

The essayist's paper is one of the most rational ones on this subject. It justly criticizes well-meaning, but oftentimes over-zealous advocates of the cause, who by their extravagant and unwarranted statements in regard to the harmful effects of mouth conditions and equally extravagant statements in regard to preventive measures, have created a skepticism on the part of some of our thoughtful people. This ill-advised work has not been without some good, however; it has helped to awaken interest in this cause, and the originally skeptical people are beginning to inquire of the more conservative members of the profession as to its real merits.

I agree most heartily with what the essayist says in regard to demonstrating to the public the real need of this work, not only in relieving suffering, but in improving the child physically, mentally, and morally. We should also demonstrate that we as dentists are willing to do our part; then the stage of "unqualified confidence" will be assured.

The essayist also fittingly remarks that each community has its own conditions to consider, and must proceed accordingly.

There is not the slightest question that the time is ripe for action. The dental profession has before it today an opportunity to prove its ability to cope with these conditions, and to show the medical profession and the laity that it is in reality a liberal profession. Certain qualities are necessary in starting this work in communities. The few who usually become enthused first must grasp the importance of this movement, must appreciate its real merit, and, above all, must be in sympathy with the many children who have had no choice in the matter of their parentage and environments, and, helpless and handicapped as they are, cannot make the most of their lives unless their harmful and in some cases wretched mouth conditions are relieved. They must have faith in the movement, faith in the people, and faith in the dental profession. The most potent means of convincing any individual, community, or municipality consists in showing results. You may not be in sympathy with medical men conducting dental examinations in the schools, or with the attitude of this or that official or of the dentists themselves. None of these factors, however, should be discouraging, as all these men act as best they can, and are usually "willing to be shown." At any rate, if there is no merit in their cause it will die a natural death.

I wish to commend Dr. Wheeler on the work that is being done in New York city. I did not have time to look over the statistics, but to me they seem very valuable. In different ways we are compiling statistics, which is certainly a step in advance, since thus we are not only proving to ourselves the results of this work, but are showing them to the public and to public officials. I received only a few days ago an interesting table of statistics from Valparaiso, Ind., compiled by Dr. Nesbit. This table shows the causes of absence and tardiness in the public schools of Valparaiso for the school years of 1910-11:

Excuses.	Time lost. Days.	Cases.
Scarlet fever	1526	51
Chickenpox	633	76
Measles	224½	20
Sore throat	524	206
Toothache	99	112
Headache	228	245
Earache	25	32
Indigestion	155	85
Asthma	11	5
Rheumatism	40	18
Jaundice	8	1
Cold	333	176
Sickness	1281½	732
Eyes	59	29
Accidents	31	10
Typhoid fever	72	1
Pneumonia	36	3
Appendicitis	7	2
Adenoids	4	1
Vermin	5½	1
Slow clock	2	44
Work	102	149
Out of town	190	124
Loitering on way	2	25
Overslept	1	21
Weather	61	62
Miscellaneous	1000	1037
Totals	6660	3268

Total loss, in school years, 37 years. Per capita cost at $50 per year, $1850.

Over 76 per cent. due to sickness; 60 per cent. due to preventable diseases. Loss due to preventable diseases, $1110.

Loss on account of scarlet fever, 8½ school years.

Loss on account of chickenpox, 3 years, 4 months, 13 days.

Loss on account of toothache, 5 months.

We are attempting to obtain some statistics in Rochester. In the beginning of the work there we paid no attention to statistics, but simply endeavored to serve the children without attempting to interest school boards or public officials in any way. These, however, have become interested in the results that were obtained, and the time will come when it will not be necessary to do any political proselyting or trying to influence this or that one in order to accomplish results. The municipal authorities will be ready to take action as soon as the real worth of this movement has been demonstrated.

We are conducting now in Rochester four dispensaries, but there is a demand for more, and it is only a matter of time when we shall be able to take care of all the children. In regard to the question as to whether this work should be supported by public appropriations or by private contributions, or both, my opinion is that it would not, at present, be well for the profession or for the cause if the municipality appropriated money enough to carry on these dispensaries, to the exclusion of private contributions and efforts. We need largely to shoulder this work at present in order that we may get into full sympathy with it and fully understand it.

Dr. WM. W. BELCHER, Rochester. Dr. Smith has been entirely too modest in not mentioning the scientific test that is now being conducted on one hundred public school children by the Rochester Dental Society, largely under his supervision. I think if any one of us had realized the amount of detail work that was necessary for collecting preliminary scientific data and engaging the co-operation of physicians and dentists necessary to make the tests truly scientific, we would have been more reluctant to commence the work. It has been a case of "Fools rush in where angels fear to tread." However, once having begun the work, we are going to keep at it with the help of Dr. Smith and the rest of the committee. At the present time, over seventy-five children are being operated on. The committee is composed of three physicians, two dentists, and one layman. Dr. Geo. Goler, health officer of the city of Rochester, is chairman. Dr. Button, in charge of the psychological laboratory, and Dr. John O. Roe, the noted throat specialist, are the medical members. Dr. W. W. Smith and Dr. C. L. Brininstool are the dental members, with Prof. Herbert Weet, superintendent of our public schools, as the lay member.

We are trying to make these tests absolutely impartial, so that when completed they will be of value, and to Dr. Smith the credit for this is due in a large degree.

Dr. Wheeler fittingly remarked that, in presenting this subject to the public, not so much the teeth as the whole mouth and its conditions should be considered. One difficulty we have met with in our dispensary work is that there are so many different methods of arriving at the same object, and that each one is working toward it in a different way. I suppose it is a good deal like the different denominations in religion—they are all going to heaven at the end, but there is a lot of lost motion and energy. I had hoped that when, at the meeting in Cleveland, we formed a national organization, this would be of a practical nature and would aid us in solving some of our problems. It is a very good proposition for an organization to consider the laity and their influence, but I had hoped that when this committee was organized it would be of a more practical nature, and that its members would have some practical knowledge of free dental dispensary work. There is room for an organization of this character, to be composed of men actually interested in mouth hygiene and practical dispensary work. Such an organization might well commence in the form of state organizations, recruited from the state societies. Many subjects of interest to those actively engaged in this work could then be considered, such as the financing of the dispensaries, the support of the health and school boards, the press and the laity, the adoption of uniform books and correct systems, and the abuses which arise in dispensary work. Unless we have some system of checking, many children, when they have an appointment at the dispensary, will make the excuse that they could not be cared for, and will play truant. They go back to school and say the dentist could not see them because he was too busy, and the teachers or principals begin to have their private opinion of the worth of the work. We have had that happen a few times, and found it necessary, if a child had an appointment and failed to keep it, to so advise the teacher. These little abuses are occurring all the while in one form or other.

In regard to charity work, there is an important difference between dentists and physicians. The physician has his office hours, and he is in attendance at his office during these hours. When he is not in his office he is supposed to be busy somewhere else, and it is rather to his credit not to be at his office except during office hours. He can see twenty, thirty, or forty patients a day, and has some opportunity for doing charitable work. He comes in contact with a class of patients whom he does not see in his office; he performs an operation for appendicitis forty-nine times for nothing, all the while preparing himself for the fiftieth operation, when he will receive a suitable fee for his skill.

The dentist has long office hours; he is supposed to be in his office all day, and, if he is not there it is to his discredit. In attending to this dispensary work he is simply repeating the drudgery of his office, cleaning teeth, inserting amalgam and cement fillings, etc.; he is not adding particularly to his knowledge, and he therefore feels after awhile that the work should be done by some salaried operator.

The absence of correlation in this work is another drawback. Men come to the dispensary on different days, and, unless someone is there to check up the cases, one operator will treat a case one day and another the next, and no one wants to take the responsibility of filling the roots of a tooth which another operator has treated; thus the case goes on, and the work is neglected. As a parallel in medicine, I may cite a typhoid fever case in a general hospital being treated by a different physician every day. If one physician treated the case regularly, the patient would very likely get well, but if the case were treated by a different physician every day, the patient would die.

The essayist pointed out that many dispensaries are poorly equipped. Some of the Rochester dispensaries are better equipped than many private offices. As to physicians making examination of the teeth, I cannot imagine such a thing happening in Rochester, for we have had so many courtesies extended to us by the medical profession. In the beginning of our work we had so much to do and so many patients to look after that we did not have a chance to feel scientific. It was a matter of doing as much as we could for the largest number; but during that busy time we felt that this work would be recognized. It has been recognized by the united board of charities; we have been asked to become members and unite with the Charities Association; we have received courtesies from the health board, all the business associations of the city, and the school board. The most gratifying event, however, was when we were given one thousand dollars by Mr. Wm. Hodge, who had offered this sum to the most worthy charity in Rochester. We had told people how great and how deserving our work was, and how much we needed money; so we had no trouble in persuading members of the board of health, school teachers, and the mayor to sign a petition that this money be given to us. The advertising that we received at that time was worth even more than the actual money. The appointment of two dentists to the New York Health Board—Dr. W. A. White from the Rochester Society and Dr. H. Wheeler from the State Society—was another recognition of our work. The Rochester Dental Society had something to do with that, although most of the credit has been claimed for the National committee by a gentleman from Cleveland. We have also been asked to appoint a member of our society to one of the hospital staffs as oral surgeon. All these acts of recognition have come to us unsolicited. We have not asked for recognition; we have simply done our part of the work.

As Dr. Smith has said, if we want to obtain an appropriation from the city, it is a delicate question whether we should ask it from the board of education or from the council. Our first dispensary was ideally located in the rooms of the Public Health Association; thus we avoided the sectarian feature, and today all religions come to this dispensary, and there has been no misunderstanding, as there might have been had we opened our first dispensary in a public school.

In connection with the dispensary Dr. Wheeler spoke of as having been abandoned, I cannot understand how, while he was vice-president of the board of directors, he would let this work drop owing to lack of support. I cannot see why, if he could induce enough dentists in New York to support this dispensary, he did not do so. He has been associated with Dr. Carr, dean of one of the schools, and I should like to have him explain why that dispensary was abandoned.

It is very gratifying to learn of the new clinics that are about to be established in New York city. This will give our cause an uplift, not only in New York city but all over the country. New York has been rather backward in accepting the gospel of mouth hygiene, and this action will have a great influence in determining the attitude of educational boards and city councils in other parts of the country.

Dr. G. F. **Woodbury**, Cleveland. I feel very much honored by being asked to discuss Dr. Wheeler's paper, and for this privilege I am indebted to the committee that has carried out the essayist's suggestions.

Before proceeding to the discussion, I consider it my duty to correct any wrong impression that may have been created in the minds of those present by a remark made by Dr. Belcher, who said, "A gentleman from Cleveland has claimed most of the credit for some of the work that originated in Rochester."

Inasmuch as I was introduced as "a man from Cleveland," you will readily see of what I am accused. I am not the man!

In passing I want to congratulate the men of New York city who have done such fine work in establishing so many clinics, as reported by Dr. Wheeler. The finest feature about this work is that it has been done without ostentation.

I have, after careful consideration, decided to discuss the most conspicuous feature of the paper, which is the absence of any reference to the work done in Cleveland by the Oral Hygiene Committee of the National Dental Association, and its experiment with twenty-seven school children.

Considering the publicity that has been given to this work and the claims made for it, one would think that it should at least be mentioned. Undoubtedly, to quote the Battle Creek sage, "There's a reason." Some of these reasons are very apparent to the men who know something of this work as it has been conducted in Cleveland. A very few of you, however, know perhaps the exact conditions that have prevailed there. Inasmuch as you have received only favorable, glowing, and enthusiastic reports of that work, it is no more than just that you should learn the other side of the problem.

The profession ought to know the actual facts, in order to prevent any further waste of time or money on methods inadequate to develop reliable results and to promote harmonious co-operation with the medical men. From the beginning, an effort has been made to keep the knowledge of the actual situation at a minimum, and criticism of the work has always been censured, while strenuous attempts have been made to prevent discussion thereof. In order to draw correct conclusions, however, you must know both sides, for then only will you be in a position to estimate correctly the importance of the work.

It is not my purpose to condemn nor to laud, but, to further the understanding of the problem and its real value, I want to make the following statement, which at the outset may startle you, but which can be proved without difficulty. The statement is this:

Notwithstanding the data furnished the board of education of the city of Cleveland in a report submitted by the

Oral Hygiene Committee of the National Dental Association, showing the remarkable increase in mental working efficiency of a small squad of school children, twenty-seven in number, who had been under the special care of the committee—notwithstanding this report I feel that the permanent establishment of dental inspection, the teaching of oral hygiene, and the maintainance of dental clinics in the public schools is farther removed from accomplishment today than it was two years ago.

This is the situation in Cleveland today: The work is closed. The clinics were discontinued in December 1910, just before the holidays, the examinations were stopped at the same time, and nothing practical has been done since then. It has been reported, however, now and then in the press and the dental magazines that Cleveland has a dental dispensary and a dental school inspector. Indeed, there is such an impression in the minds of the public; but as a fact there are no clinics or dental inspectors. This situation may seem rather strange to you after all that has been said and done, after all the time and money that have been spent; nevertheless it is true.

I shall not take much of your time to go into details regarding this matter, but I must set before you briefly some of the essential features to show why this condition exists. I need not presume or speculate; I have the facts to present.

Dr. Belcher. I think we are all interested and want to hear all Dr. Woodbury has to say.

Dr. Woodbury. To begin, then, the factor that has contributed most, in my opinion, to put oral hygiene in its present condition—viz, of nothing practical or permanent being done toward establishing dental examinations or clinics, or anything else of real value—the one factor that has contributed most to create this condition has been the antagonism against the medical men, whose co-operation we must have, because these men are most vitally interested, have the most powerful influence in this work, and are the pioneers in sanitation and health supervision in the public schools. Medical inspection has been completely ignored by the oral hygiene enthusiasts, and, furthermore, it has been unjustly belittled by these men.

The following incident is one of many that have tended to alienate the support of the medical men in Cleveland: A bill was originated by the medical men and supported by the sanitation committee of the chamber of commerce, and became a law in 1910, to authorize the board of education to employ at a salary medical inspectors in the public schools. When this bill was being considered by the committee, a number of dentists were invited to consider some of its provisions. An effort was made at that time to have the word "dental" included in the bill, but it was thought unwise by the framers of the measure to do this, because it would undoubtedly defeat the passage of the bill.

Since this measure became operative, medical inspection in the public schools has been carried on at an annual expense of $28,500. It provides for one superintendent, fifteen inspectors, fifteen nurses and one clerk. While this bill was before the legislature at Columbus, the chairman of the Oral Hygiene Committee of the National Dental Association—who was also the chairman of the local hygiene committee—and his associates went before the board of education and said: "We want permission to go into the schools, examine the children, and establish four clinics, and we will do it without any cost whatever to you, if you will give us the permission."

Inasmuch as that proposition was made just at the time when the aforementioned bill was before the legislature, some of the medical men regarded this offer to the board of education as directly antagonizing their effort to secure medical inspection in the schools, which also authorizes an appropriation for this work.

It looked to many of the medical men as if that act was intended as a retaliation by the dental men for their inability to get what they wanted in this bill, and savored of an effort to thwart its passage. It has been said that if this antagonism had not occurred, one or two dental men would have been appointed on the medical staff, inasmuch as it was within the power of the board of education to make such appointments.

The support of the medical men has been alienated by this kind of opposition, and if dental inspectors are to get into the public schools, they must have the approval of the medical men. It is shortsightedness not to make every effort to have the co-operation of these men.

In opening this discussion I referred to the Marion school squad. Since the results of that experiment, as reported by the Oral Hygiene Committee of the National Dental Association, form the basis for all the claims that have been made by this committee, it will be profitable to look more closely at this class, and also to analyze the official reports as well as the statement that this experiment furnishes the most important scientific data that have ever been presented to the National Association.

At the outset we may well ask this question: If the facts gained from the Marion school class are as important as they are claimed to be, why has not the board of education taken some action on these reports?

There is only one answer, and you can guess it. The report submitted by the National Committee on Oral Hygiene shows that this class made a gain in efficiency of 99.8 per cent., but to what particular factor this remarkable showing is attributable is not apparent. How much of this improvement was due to changed environment cannot be estimated, nor how much to repair of dental lesions. In order to lend the data gained from this experiment real scientific value, there should have been something to compare them with. Another class should have been selected of similar characteristics, defects, environment, sex, and age, and subjected to the same treatment except dental operations, and at the end of the test a comparison should have been made. Since no evidence was collected to make comparisons from, the data obtained have little really scientific or practical value.

Mr. Hicks, assistant superintendent of instruction in the Cleveland public schools, however, gives great credit to the influence of this class in Marion school. He makes the statement that many of the double promotions (341), which exceed the non-promotions in this school, were the direct result of the influence of this class. No credit is given to the medical work done in this school, which has been in operation a number of years, comprising a dispensary in charge of an exceedingly competent physician, with a nurse in attendance.

Of this class of twenty-seven children, one made double promotion; one failed; six completed thirty-eight weeks' work in twenty-four weeks, leaving nineteen to make normal promotion. This is a very good showing when one takes into consideration that most, if not all of the children, were behind their grades. From what causes these children were behind their grades is not stated; this information is most important in computing the result of this experiment.

Another item of interest is the psychological tests. They also lack some of the essentials that make the tests in every particular of much value in determining the influence of the contributing factor. This is so because, after the initial test, two tests were made before much dental work was done for any of the children, and for the larger number no work had been done at all. In fact, dental operations were not completed for any of the children until after the first of the year—nearly five months after the test. Some of the work done for a number of the children was not completed until just before the final test in May 1911. This fact has made it difficult, if not impossible, to determine the proportionate amounts of improvement directly contributed by dental repairs or by changed environment.

It must be conceded that changed environment, the result of constant supervision of a special nurse in this class, had a large part in the results of this work. Another contributing factor is that the children were a year older when the final test was made, which must be reckoned with.

The expense of this work has been no small item, and it is a question whether the results justify such an expenditure. Four thousand dollars were contributed by the Dental Manufacturers' Club; $1600 in work by members of the Cleveland Dental Society, besides $1339 contributed by the latter in cash. About $7000 was expended in this experiment on the twenty-seven children, viz, nearly $260 for each child. In the four clinics, 372 patients were operated on, and the materials for all this work were furnished free.

There is one other item which I would mention before concluding, namely, the changes made in the initial test as stated in the first and the final report, and used as a basis for computing the gain in working efficiency of each of the twenty-seven children. It is supposed that the initial test would be the same in the two reports; in fact, the first test should form the basis of comparison for all subsequent tests. But the second report contains over thirty changes of the initial tests, and some of these are startling.

For instance, in the case of Rachel Somers the following changes are noted:

Initial Test.

	First report.	Second report.
Memory	36.6 points	36.45 points
Spontaneous association	36.3 "	27.05 "
Addition	32 "	19 "
Association by opposites	32 "	12 "
Quickness and accuracy	43 "	36 "
	179.9 "	130.50 "
	130.5 "	
	49.4 "	

In this one case, the final report of the initial test is lower by nearly fifty points as compared with the first report. What does this mean? It means that if the child had actually lost in points in the final test, by lowering the initial test there would still be a gain.

There is no desire on my part to minimize the real value or to exaggerate the defects in this experiment, but I would make an unimpassioned effort to get at the actual conditions.

The most striking evidence of the value of this work is shown by the attitude of the board of education. The report of the Oral Hygiene Committee of the National Dental Association was submitted in February 1911, and went into the custody of the "welfare committee," and after eight months it is still there. In the meantime the board of education is providing, at a considerable expense, a number of outdoor schoolrooms to take care of such children as the Oral Hygiene Committee of the National Dental Association has guaranteed to improve in health and working efficiency.

Dr. W. A. White, Phelps, N. Y. I have been regularly attending district, state, and national dental meetings for the past twenty-five years, but I never in all my life listened to such remarks as have just been made by a gentleman who represents our profession in the state of Ohio, and comes here as a stranger, but to whom I regret I cannot accord the courtesy due to a stranger within our gates. I think it is the height of impudence on his part to stand here and inject into this discussion matters with which this meeting has nothing whatever to do, and which are in no way connected with the paper under discussion, and at the same time attack a man who is not here to defend himself. If he had wanted statistics, he could have secured them, but I cannot refrain from saying that many of his statements are not true. His statement that the National Oral Hygiene Committee spent six thousand dollars to educate or improve twenty-seven children, he knows is not true. If he had wanted to know how the National committee used the money received from the Dental Manufacturers' Club, from the Dental Society of Cleveland, and other societies, he could have found out.

His statement that the medical profession is qualified to dentally examine school children as well as you gentlemen educated as dentists, he knows is not true. So many remarks have been made which it would require so much of your time to refute that I regret that I was not here to take part in the discussion, but my presence at one of the school hygiene meetings prevented me from doing so. As a member of the National Oral Hygiene Committee, I regret that I am compelled to make these remarks, but I must speak in defence of Dr. Ebersole, who has done so much work in that committee.

It has been asserted that members of the committee have claimed that they could cure disease, but I defy anyone to mention the name of one gentlemen who made such a statement. They can prevent disease, not cure it, and they have never said so.

I am sorry, Mr. President, that I was obliged to make these comments on the remarks of the gentleman from Cleveland.

Dr. WHEELER (closing the discussion). Dr. Smith has taken me to task for using the term "dental clinic." I wish to say that I used it for the reason that at St. Bartholomew's Hospital the legal name is clinic; the clinic includes the nose, throat, eye, and ear departments, and the dental department is known as the dental clinic. In Philadelphia they call it the dental department, in conformity with their other departments.

I trust that attention will be called to the statistics from Valparaiso which Dr. Smith has mentioned, because they are valuable. If Rochester and other cities would give us more reports of that kind they would greatly interest us. Dr. Belcher's idea that it would not be well to appropriate money for dental purposes is a new one to me, but I again repeat that in many instances this is a local matter, and Dr. Belcher surely knows the Rochester situation better than I.

I have been asked why I did not appreciate the work that is being done in Cleveland. I do appreciate that work, but I think a great deal of it was useless, because it was absurdly and ridiculously exaggerated. Nevertheless, I believe it may serve a good purpose, and have no quarrel on that score, but, if we attempted to do the work in the same way, with a nurse paid by the supply houses, it would require fifteen hundred attendants to care for the school children in New York alone, and how are we going to get the dentists? Dr. Maxwell offered to the Dental Society of New York that, if they would designate in a short pamphlet what they consider as being necessary to teach in the schools in the matter of mouth hygiene and caring for the teeth in general, he would have it printed, and would see to it that this subject is taught to the children. This is a most valuable suggestion for conducting this movement in the public schools.

Dr. Belcher said that I made no claim to credit for the work that was done by the board of health. I have taken a part in the campaign, but the First District Society has really backed it, and has presented to the health board the suggestions of the representative dentists incorporated in various dental societies, and has thereby lent power and influence to this movement. In the New York clinics the question of sectarianism has never been allowed to enter. The St. Bartholomew clinic is supported by the Episcopalians, but there has never been any question raised as to sect. All classes of foreign and poor children come here, and no questions are asked as to their ability to pay.

In the matter of public school inspection by the medical profession, I presume we shall have to submit to being under their direction for a long time yet. In New York the head of the oral hygiene department is a woman physician, Dr. Baker, and the dentist will have to report to her as director; but what of that? I do not object as long as the dentist receives proper pay, equal to that of the physician. Although I do not know the exact figures, I think the amount of money appropriated is thirty-six thousand dollars; but if we were to spend an amount of money corresponding to that which is said to have been spent in Cleveland, it would cost the city of New York one hundred and eighty-five millions of dollars to carry on the work.

Dr. N. S. HOFF, Ann Arbor, Mich. As a matter of some interest, I want to report that in our city we have a dentist as an inspector in the public school, where we also have a medical inspector. The dental inspector is paid not quite as much as the medical inspector, who receives six hundred dollars per year, while the dental inspector receives four hundred. As the result of that inspection, during the first year we have had a stream of school children coming every afternoon to the college clinic to have work done. I want to report this fact so that some of you may cite it to your school boards to convince them of the merits of such an arrangement.

The next order of business for the afternoon session was the delivery of a lecture by Dr. J. L. KELLY, Chicago, Ill., entitled "Removable Bridge Work." Dr. Kelly's lecture consisted of a description of a special form of bridge work, illustrated with numerous lantern slides.

The President then declared the meeting adjourned until the evening session.

THURSDAY—*Evening Session.*

The meeting was called to order Thursday evening at 8 o'clock by the president, Dr. R. E. Luther.

The first order of business for the evening was the reading of a paper by Dr. N. S. HOFF, Ann Arbor, Mich., entitled "How Shall the Profession Meet Its New Obligations Resulting from the Propaganda for Popular Education in Oral Hygiene and Preventive Dentistry?"

[This paper is printed in full at page 778 of the present issue of the COSMOS.]

Discussion.

Dr. M. L. RHEIN, New York, N. Y. I regret exceedingly that it has been impossible for me to prepare what I want to say on this important subject.

The essayist requires no introduction to a dental audience. Whenever and wherever dental education is considered, the name of Hoff commands the highest respect, and he is especially endeared to us in this age of hypocrisy for his candor and honesty. As a warm and sincere friend I have known him for several years, and consequently I am more than distressed to find myself so radically opposed to the views he has presented here tonight. Dr. Hoff reminds me of one of that host of gallant and noble citizens of the South who for four years fought their brethren of the North in such great desperation and fear—they fought for a lost cause from the beginning. In this world of evolution slavery could never endure. Just as the right of slavery was wrong, so are the premises on which the essayist has built up his argument. A distinguished medical writer has called attention to the narrow views which all specialists necessarily hold. Dr. Hoff's specialty is the manufacture of dentists, and the personal welfare and success of his product are as dear to him as the longevity of a filling is to the dentist. It is wrong, however, to consider the dentist from the standpoint of the labor union or trade organization; the royal distinction of the true professional man consists in the exclusion of his personal welfare if it interferes with the public welfare. The physician will always be the real priest of the people, and as the preservation of the human mouth in a state of health is the most important factor in maintaining a long and healthy life, the true dentist sooner or later will become known to all, as he is now to a few, as the veritable high-priest of the people. In other words, it is the present and ultimate oral welfare of the world at large that should be our consideration, rather than the welfare of the dental profession.

I realize that Dr. Hoff, after his long experience in teaching, has clothed this beautiful essay in such language that his point is more or less gained; but this point is the real bone of contention that I have met with ever since it was my pleasure to emphasize publicly the manner of serving, not our few private practices, but the conservation of the health of the masses, not only in this city or these United States, but in the whole world. There probably never will come a time when the professional men will be of so large a proportionate quantity that it will be possible to meet this demand in any other way. Shall we, on that account, use our efforts to prevent the depleting of the health and the life of the great masses in order to maintain what has been spoken of as the dignity of dentistry? I refute it! The dignity of the profession is manifested when it devotes itself body and soul to disease prevention and the welfare of the public at large.

The great difficulty in the work that we are engaged in lies in the fact that only a few of many millions know the truth of the statement that we are practicing a part of the healing art in the sense that the essayist so beautifully presented to us as preventive dentistry, which is so idealistic that no part of medicine can be compared with it. What do we mean by "preventive dentistry"? The essayist has well said that preventive dentistry does not mean the polishing of the tooth surfaces and the removal of deposits; this is but an incident in the practice of preventive dentistry. I would define preventive dentistry as the placing of the mouth in a condition as closely resembling the physiologic or normal as possible, and, by our own and the patients' efforts, retaining it in that physiologic state as nearly as possible.

When one speaks of preventive dentistry as a specialty of dentistry, I absolutely cannot appreciate it. Orthodontia is a specialty of dentistry—a man may devote himself entirely to orthodontia; we may give our undivided efforts to crown and bridge work, to prosthesis, to porcelain or gold inlays—but preventive dentistry includes every dental specialty, and that is the reason why the men who pose as specialists in this line are absolute frauds from beginning to end. A man or woman may designate themselves as specialists in the polishing and cleansing of teeth—and upon careful investigation of the work of all these so-called specialists I find that is all they do—but, as the essayist has so well remarked, the simple drudgery of polishing tooth surfaces and removing simple deposits is not preventive dentistry. For that portion of the tooth which extends from the dental ligament to the incisive or coronal parts, and for this field alone, I have suggested the introduction of a person similar to the trained medical nurse, and this suggestion has been taken up with a great deal of eagerness by a great many men in every part of the world. I can speak on this subject with the feeling that I am free from the use of the trained dental nurse in my own practice, which is made up of patients who are willing to pay for the services of dental graduates. I have employed dental graduates on that account, so that I am free from any bias in that direction. I have trained dental nurses, however, for other dentists, and I am proud of the product which I have sent to them. In regard to the lack of idealism on the part of the non-graduate dental nurse as compared with the graduate woman dentist, I totally differ with the essayist after an experience of over ten years. He has quoted Dr. Spalding, and, with due deference to that estimable lady, I am forced to speak in plain language. Let us take her career. She practiced as a specialist in dental prophylaxis along the lines which I have stigmatized, until she married, and since then she has abandoned that practice. Is that a professional and ideal conception of this subject? Will a person whose heart is truly in the work abandon that work in such a manner? She is not the only woman of that type that I know of. I have seen women dentists do beautiful work in that field, but they have tired of it, and I have many times heard them say: "If I could only marry someone, how gladly I would abandon this work," and she finally married. This is not new to those of you who have thought carefully over this point. These women dentists have been incapable of finding in that work sufficient solace for their feminine instincts, and I do not blame them. That is not dentistry, but the handmaiden to preventive dentistry; yet we require that handmaiden. We require it for the people, for the school children, for the poorer masses, though we cannot raise the proper amount of funds to demonstrate this necessity. A few of us who represent the class of dentists who are assembled in this room realize that necessity, but does the public realize it? Does the physician realize it? It is true that we have been making converts in the last few years among the medical men in a more rapid way than ever before, but we have only begun the work. As soon as the medical profession realize what a few of them do today, viz, that the maintenance of a healthy mouth can be compared to that fountain of youth for which the celebrated Ponce de Leon sought so long, they will immediately correct one of the most vital defects in the medical curriculum, this defect consisting in medical men receiving diplomas entitling them to practice medicine with no knowledge at all either as to the physiologic or the pathologic conditions of the oral cavity. When that time arrives, the true function of the physician, who is the mentor of the public health, will be to see that his patients understand the real benefit of preventive dentistry.

I want to quote here from the essayist: "We can, of course, probably legalize trained dental nurses with similarly restricted functions, who could safely cleanse the surfaces of the teeth from calculus and other extraneous deposits in healthy mouths, without much risk of infection or injury." He knows that he is standing up for a lost cause; he admits it here in black and white. The trained nurse is not supposed to treat pyorrheal conditions or do any surgical work on the dental ligament. The simple drudgery of cleansing the accumulated plaques and deposits from the enamel surfaces, and keeping the enamel clean and polished is all that is asked of her; her duties begin and end there. While, to my mind, this is a very simple matter, yet the simplest matters should be done properly. Even this simple matter, I admit, can be done injudiciously, and so as to produce great harm and injury, but I deny that it requires a trained graduate dentist to do this little drudgery. The fact that the so-called specialists in this work all look askance at the restorations of the mouth to a condition ideal as nearly as possible is the worst reproach and criticism that can be made against the men and women who have been advocating this work on an unreasonable, irreconcilable, and illogical basis, because in all the studies of the pathologic conditions of the mouth we have, as the essayist noticed in one part of his essay, pretty generally come to the conclusion that a mouth with normal occlusion can be retained very nearly in a normal state. In the varying forms of malocclusion, however, which presents itself to us in so many guises, the frequent treatment of the peridental tissue and the polishing of the tooth surfaces are all more or less unavailing unless the malocclusion is repaired.

The essayist has alluded to one other point that I want to touch upon and which was brought up in our state society meeting in 1903, when I went before the society council with high enthusiasm and with the unanimous indorsement of the American Medical Association, but was squelched at Albany. Why? Because —what would happen if the advertising quack had the opportunity to employ dental nurses? This fearful ogre was presented to the society council at Albany, and I was unmercifully downed on that historical occasion. I will tell you what would happen. The dental quack, the advertising dentist, would become a better practitioner if he did employ dental nurses. He would see cleaner teeth than he ever saw before, and instead of working in a mass of filth, as many so-called dentists do, he would see a cleaner field for his work, which could do him nothing but good.

The essayist has spoken about the falling-off of new matriculants in the dental colleges during the past six years, which he attributes to the fact that the dental colleges are endeavoring to raise the standard of admission. This is true, and yet it is false. No one sympathizes more than I do with the men who are placed in this position. The essayist's statement is false because the standard is high enough. The colleges have lost, it is true, the most undesirable material, but until this branch of medicine, which is the equal of, if not superior to, any other branch, has raised its requirements to the standard of those of the medical curriculum, we shall ever fail to gather to our department the men who refuse to enlist in any branch of the profession that is lower in its requirements than any other branch. This point the dental educators failed to grasp twenty-five years ago; that was the time when they lost their grip on the youth of this country, by failing to keep step with the advance in the requirements of the medical schools. If we lose matriculants now, it makes no difference; the future outlook of our profession in this country depends upon how swiftly we can reach the point when we stand on perfect equality with any branch of medicine in the entrance requirements for dental students; when we reach that position we shall no longer be in the lamentable situation that the essayist has presented to us tonight.

Dr. A. C. **Fones**, Bridgeport, Conn. With regard to the deductions of Dr. Hoff's paper which finally bring us down to the solution of our problem by taking graduate women from the colleges as prophylactic assistants, I feel very much like the polite Frenchman who, contradicting his friend, said: "What you say may be perfectly true, but God knows it is impossible." The question of taking graduates from the dental colleges for prophylactic assistants is absolutely impossible, because we cannot get them, and we shall not be able to get them for twenty or twenty-five years to come.

Ninety per cent. of the school children are suffering from defective teeth. Of the ten millions of school children in the United States, only one-tenth are taking any care of their teeth. Think of the repair work, the surgical work for the dentist alone! Do you suppose that a woman who is a graduate of a college would come into your office and accept a nominal salary as a prophylactic assistant, when she could make three or four times that amount of money in her own practice? The oral hygiene movement throughout the United States is very helpful, but the ravages of caries will never be checked by filling teeth and by the use of the tooth-brush alone. This evil must be checked by preventive treatment, viz, the treatment of the surfaces of the teeth of the child, and the only way to accomplish this is by training women to help us. These women need not necessarily go through college, but simply need men to teach them how, and they can do glorious work.

Nearly all the disease conditions of the mouth are due primarily to the decomposition and putrefaction of animal and vegetable matter. Dental caries with its various complications, and the primary conditions of pyorrhea alveolaris, have their origin in the products of decomposed food. It is true that bacteria play an important part, but their influence at this stage is secondary. The formation of an alveolar abscess is produced in a like manner. The bacteria decomposing the dead pulp tissue generate certain gases and poisons which primarily start the abscess. What, then, is preventive treatment? For the patient, it is the constant and thorough removal of all food débris in the oral cavity; for the dentist, the placing and maintaining of the crowns of all the teeth in an ideal condition so as to facilitate the removal of food. That is the subject in a nutshell. Bacteria are perfectly harmless in a clean mouth, and on clean teeth free from food débris. They are harmful when they have a pabulum upon which to feed and multiply, and an unclean mouth presents food for all kinds of bacteria.

What is prophylaxis? Prophylaxis is the surgical and scientific effort to prevent disease. Again, what is prophylaxis of the mouth—oral prophylaxis? Smooth, polished fillings with no shoulders on the approximal surfaces and at the gingivæ to hold food débris; contact points to protect the interdental spaces so that the food in mastication is not jammed down between the teeth to start a condition of irritation, of absorption, and a pocket; crowns so constructed that they have flush joints with no shoulders to collect food débris; bridges constructed on scientific principles so that they will not hold food débris, and can be readily cleansed by the patient; root treatments scientifically carried out with removal of all dead pulp tissue; orthodontia considered for normal occlusion—I could name a number of other conditions, but to come down to the last two, viz, polishing of all the surfaces of all the teeth with orange-wood sticks, the thorough instrumentation around the necks of all the teeth for the removal of calculus, and the proper mode of treatment and advice to the patient as to the care of the mouth at home—these constitute, in the main, oral prophylaxis.

As to specializing in prophylaxis, I wonder what that means. I had a gentleman approach me at Cleveland, who said that he was making a specialty of prophylaxis. I said, "Is that so? Now, then, tell me what do you do as a specialist in prophylaxis." "Well," he said, "I am giving these prophylactic treatments for the polishing of the surfaces of the teeth, thorough instrumentation and care of all the crowns of the teeth." "Supposing some patient required a cavity filled," I said, "what would you do?" "I would send him to his dentist." "Do you mean to say that you do no operative work at all?" "None except instrumentation and polishing." Can you imagine anyone who has a thorough knowledge of all the branches of dentistry making a specialty of doing nothing but instrumentation and polishing? I cannot conceive of a dentist being willing to confine his entire efforts to the surface treatment of teeth. I have practiced prophylaxis since 1900, and find it beautiful and gratifying work to bring a mouth up to a condition of health and beauty, and yet if I were obliged to do these surface treatments alone and nothing else, I think I would give up dentistry.

By way of going a little more into the detail of prophylaxis, it may be interesting to relate some of my own personal experiences in this field, and it may prove helpful in inaugurating prophylaxis in your own practice.

When I became enthusiastic about prophylaxis, I made this resolution: Every one of my regular patients must have clean and polished teeth and healthy gums. Each patient should be taught the proper home care of the mouth. No patient would be permitted to present himself with food on his teeth. I was through with filthy mouths, and never again, except with a new patient, would I permit a patient to present himself with an unclean mouth or to leave my office with calcular deposits or unpolished teeth. These were my resolutions. At the start, the work was chiefly educational, as the fundamentals of prophylaxis had to be explained to each patient. Eventually they grasped what I was trying to accomplish, and then the tedious explanations became much lessened. Before long I found myself swamped with prophylactic work, and had not sufficient time for the operative work which had accumulated and needed attention. I could take no new patients, and required an assistant. The woman I had in the office as chair assistant was extremely intelligent, and I decided it would be possible to train her in this treatment. At that time, in the state of Connecticut, an assistant was permitted. I succeeded in training her so that she could begin her first treatments for children after a series of instruction which lasted about four or five weeks. After she had been polishing teeth for children for about six months—and from the start she obtained good results—grateful mothers were willing to entrust themselves to her hands, and it was not long before she had a number of patients coming to her for regular treatment. After two and a half years of this work, I made it compulsory that all my patients must undergo this prophylactic treatment, and in the last four years I would not accept a patient in my practice, unless he agreed to submit to this system of prophylaxis.

That woman assistant is doing a work which is simply indispensable to me. If I lost her I should have to train another woman to do the work. I would not think of going back to the practice of general dentistry—rather would I give it up. Every patient who comes into my hands has a clean and healthy mouth. I have eliminated eighty per cent. of dental operations in my practice, merely by establishing a clean condition of the teeth, and training my patients in home treatment. That is what I have done, what others have done, and what any practitioner can do, if he starts the work in an intelligent manner to accomplish results.

The question as to how we shall obtain assistants is very important. In Connecticut, in 1905, the privilege of engaging new unlicensed assistants was withdrawn, but a clause was inserted in the dental law permitting an assistant to be trained by licensed practitioners in giving prophylactic treatments. I believe that all the states will have to make some such provision. If it is feasible or possible to get a graduate to do this work, after a few years the patients would be just as much his patients as our own, and there is no reason why that assistant should not open an office, and take half of our practice with him. I doubt very much if any man or woman who is a graduate of a dental college would be content to work for a salary, when they could earn so much more for themselves. Dr. Hoff's suggestion, therefore, is purely ideal, and not practical. This whole nation needs to have its teeth cleaned, and needs it now, and we want a solution of the problem now, not twenty years hence. This solution, in my opinion, can be brought about only by practitioners being permitted to train women in their own offices. I think the proper solution of our school clinic problem will be solved in the same way. It is possible to train twenty or twenty-five women in this work, and if the children who come to the clinics are given a thorough polishing of their teeth, are taught how to use the brush, and are induced to present at regular intervals for this treatment, caries can be prevented in a short time. But to fill the millions of cavities in the teeth of school children is practically impossible.

It might be well for me to state that the suggestions of Dr. Hoff and Dr. Spalding are based on different viewpoints as to how a practice should be conducted. A dentist may not desire to do any instrumentation or polishing himself, and leaves all this work to an assistant; that is one way. If he is only to see patients when his assistant tells him that there is some operative work to be done, then the assistant becomes the dentist, and the dentist becomes the repair man. Personally I prefer to see every patient every six months, to give his mouth a thorough examination and a prophylactic treatment. In this way, I know the condition of each patient's mouth, and can also see if my assistant is thorough in her treatments. I find this procedure both desirable and restful for me. Devoting one hour to a patient who is to be examined and given a prophylactic treatment, and spending the next hour in operative work, breaks up the continuous strain that is so wearing and enervating. In this way a large number of people can be attended to in an endless chain, and their mouths can be kept in fine condition. It is possible for every practitioner to do this, if the state in which he lives will give him permission to employ an assistant in his office, and train her to do this work.

Dr. H. L. Wheeler, New York. I cannot agree with the essayist in every respect, because there are two sides to the question. What are we going to do about obtaining a dental nurse with the proper preliminary education and the proper professional training? In my opinion the trained nurse from any of our hospitals would fill this need. She is a graduate trained nurse, and probably would be permitted to clean teeth and polish them in a dental office. Yet such a trained nurse demands twenty-five dollars a week, and for the same sum of money I can engage a clever graduate from a dental school on a ten years' contract.

Voice. That graduate would later enter practice and take away many of your patients, would he not?

Dr. Wheeler. Well, what is the disadvantage? I would take my chance on holding my practice with the graduate. I think, too, that patients have some ideas on these subjects, and they would rather be treated by a graduate who has had the proper training, than by a nurse who has merely had a hospital training. I rather think, myself, that it would be good for some practitioners, if it could be properly arranged, to have these women—with proper limitations as to their work—do the cleaning of teeth, not prophylactic work in its entirety. We have to draw the line somewhere, as the physician has drawn the line at administering medicines internally and using instruments. If the dentist used the instruments, treated the pyorrhea cases, and removed calcic deposits, while the nurse used the orange-wood stick, brush, or whatever may be used for polishing the surfaces of the teeth, we might get along very well, and probably no new law will be needed in this respect, although a committee has been appointed by the state society to take up this matter. In New York city, at the present time, Bellevue Hospital has in its dental department a trained nurse who assists the interne, and my secretary has also served three years in that dental department, yet I would not think of allowing her to work in my patients' mouths. In fact, I have such old-fashioned ideas on this subject that I am inclined to send her to a dental college to obtain the dental degree before putting her to work.

Just what the enthusiasts in prophylaxis consider to constitute dental prophylaxis, and where they draw the line, I have learned tonight. I have seen patients of some of our prophylactic workers in New York who claim to devote themselves exclusively to that specialty, and I have discovered that their work includes not only the scaling of calcic deposits from the teeth, but the making of porcelain bridge work, of artificial crowns, and even rubber plates, and Dr. Fones says that it includes even orthodontia. If a nurse, therefore, is to do "prophylactic work," she will have a complex field to work in!

I must confess that I am less worried about the problem than Dr. Hoff. I am not absolutely and unqualifiedly opposed to women assistants in the dental office, whether they be called nurses or assistants, but if such a woman nurse or assistant is to go beyond the mere polishing of the teeth, there should be some definite qualifications, some standard to which she should come up—thus guaranteeing that she knows something of the human system and understands oral conditions. The temptation will be great—not for high-class practitioners of principle and integrity, but for a great many practitioners of less high ideals—gradually to allow such a woman to do more or less dental work, and these men will some day find themselves in the position Dr. Rhein spoke of, viz, these women will set themselves up in practice, and will take over that class of patients who cannot afford to pay a high price for a qualified dentist's work.

Those practitioners who want nurses will have to engage them and try them out at the present time in the same way as the physician engages them, since the law does not prohibit it. If that procedure does not prove satisfactory, the honest and sincere practitioners can agree on some adjustment and overcome the objections that may be raised in regard to the possibilities of abuse by dishonest ones.

Dr. R. H. HOFHEINZ, Rochester. If I had known that I would have to compete with so much eloquence, I should have committed these few lines to memory, and allowed my own eloquence to soar at times. However, I took the advice given last night by Dr. Black, who said that it was a great deal safer to put notes on paper, and so I devoted a good deal of the morning to looking over the essay and jotting down my thoughts.

We have listened to a competent writer and an earnest advocate of a subject which, according to Dr. Hoff, appears like a threatening obstacle, with possibly a disastrous outcome to the great work so successfully inaugurated by the profession of dentistry. We have also heard the other side equally as earnestly and eloquently presented by Dr. Rhein, who has stood for the advancement of dental science and education ever since I have known him, which is almost thirty years.

What does the subject present under such circumstances? Nothing more or less than that of evolution. Dr. Hoff tells us that there is an increased demand for dentistry, and that our individual practices are keeping us busy. If anything is to be credited with this fact, it is the universal agitation for proper prophylaxis, together with our constantly increasing population, and possibly the slight decrease of dental graduates. It is no doubt true that the dental college that can boast of the best equipment for technical training and the largest amount of clinical material will attract the largest number of students.

We cannot possibly expect from the novice who enters the profession of dentistry to discriminate wisely between quality and quantity; less can we expect of him to know that our reconstructive abilities or tendencies are being pushed into the background by our healing and preventive endeavors, when a large number of practitioners themselves have as yet failed to comprehend this simple truism.

In the very beginning of his essay Dr. Hoff tells us that only thirty thousand dentists serve ninety millions of people, and he asks: "Where is the dentist who can serve, even in a relief way, his share, or three thousand people?" Let us remember this sentence; it may serve us later in the argument, as may also the statement that the number of desirable graduates and legalized dentists is very small, and that the colleges are graduating fewer students.

Before presenting his own view of the case the essayist stated those of a number of others, and first Dr. M. L. Rhein's suggestion of the "trained dental nurse." I was for some time inclined to agree with Dr. Rhein's views as presented in that well-known essay. I do not agree with him, however, that women can be taught to do this work more skilfully than men. There is no good reason for that statement. Efficiency depends entirely on proper teaching, love for the work, and personal fitness. I must also disagree with him that women assistants would remain permanently and loyally in one's practice. Even women dentists or dental nurses have a strong leaning toward the matrimonial goal, and my experience has been equally unfortunate with both sexes.

Dr. C. M. Wright's suggestion of the "denticure" is nothing else but Dr. Rhein's dental nurse, with a few additional elaborations as to the details of the curriculum. Personally I dislike the title denticure, possibly because my knowledge of English is more limited, possibly because my musical sense is more intense—it savors too closely of pedicure and manicure; moreover, the operation in question has a scientific side which is entirely absent in the other two occupations.

Dr. Fones' suggestion has a similar trend along the lines of Dr. Rhein's trained dental nurse. I entirely disagree, however, with Dr. Fones as to the sources from which he would secure the dental nurse. If there must be a dental nurse, she should be thoroughly educated at a proper school where the specialty which she expects to enter is properly taught. No doubt Dr. Fones and others would be thoroughly capable of training and teaching, but we must not overlook that Dr. Fones himself says, "The vast majority of dentists have no appreciation of the preventive value of oral prophylaxis." If that is true, how many dentists are there left to educate the necessary dental nurses?

Dr. Grace Rogers Spalding is very emphatic in her statements. She tells us that the dental nurse does not and never can exist, because she would be incompetent to do the actual work, and could never gain the confidence of patients. I doubt both of these statements. If a dental nurse is properly educated, as suggested by Dr. Rhein and others, she certainly need not be incompetent. I also believe that an intelligently trained nurse would gain the confidence of the patients at least as quickly as the many dentists who, as Dr. Spalding tells us, are unwilling to master the technique of oral prophylaxis. American patients have a very keen faculty of discrimination for or against a practitioner, be he with or without a title.

So much for the views of the various practitioners quoted in Dr. Hoff's essay, in which he also informs us that if Professor Miller had lived to complete his research on the oral toilet, we should have more scientific data to work from. When in Europe last summer, I received a letter from Dr. C. F. W. Bödecker—now practicing in Berlin—telling me that he had produced a paste which would keep the oral cavity antiseptic for eight hours, which, of course, means immunity of the oral cavity against the action of bacteria if the paste is used three times a day. He sent me a few samples which, however, did not reach me. His researches and conclusions will be published in the *Dental Review,* if they have not already appeared. If the profession could get a remedy of such therapeutic efficiency, the question before us could be readily disposed of.

The question, however, remains—Shall prophylaxis be practiced (1) by a trained dental nurse, and thus possibly service be given to the ninety million people of our country, or (2) by a few specialists or by the general practitioner, who, as has been stated, can only to a small degree realize the importance of prophylaxis, or (3) by the diminishing number of students yet to come? Personally I have always had a dental graduate in my office who did more or less of the prophylaxis work. Only in one instance, the patient being about to leave town and the assistant being ill, I employed a young man who at that time was a student of mine at the University of Buffalo, and who was employed in the office of my neighbor. To my amusement and surprise a friend and member of the law committee reported the case at one of our meetings, unfortunately, however, during my absence. It would have afforded me untold pleasure to be present, especially as I knew that I had the legal and moral right in my favor.

Dr. Hoff says that the trained medical nurse corresponds more nearly with the trained dental nurse, but we should not forget that the trained medical nurse of today is more thoroughly trained for her work than the dental nurse. This is undoubtedly true, but we must not forget that the medical nurse is not an institution of today or yesterday, but of many years past, and there is no good reason why the dental nurse should not have the same law of evolution applied to her.

Dr. Hoff recognizes the fact that while prophylaxis is gaining in favor, conservatism and force of habit render it difficult for most practitioners to do this work themselves. It is not always habit or conservatism that relegates prophylaxis to the assistant, but more frequently necessity. What is the busy practitioner to do? He must let the assistant do one thing or the other. The patient is infinitely more willing to let the assistant perform the prophylaxis work than the operations that are of a more painful nature.

If prophylaxis will in time eliminate eighty per cent. of our operative work, as has been stated, neither the dental nurse nor the dental graduate will be needed as assistants. We will all have plenty of time to do the work ourselves. But this time has not yet arrived. It is still a utopian idea as far as the masses are concerned, and at least one more generation will require dental repair until its death.

As before stated, I have always employed a graduate in my office, and expect to do so for the balance of my dental days. My view on this subject is free from any personal feeling or bias. This question, after careful consideration, presents to me partly a professional and partly a humanitarian view. I admire Dr. Hoff's attitude in attempting to keep up ideals. Ideals, however, do not always possess the same value when applied practically.

If Dr. Hoff had not told us that thirty thousand dentists try to serve ninety millions of people, and that no dentist could serve his share, in a relief way—if he had not informed us that the dental colleges have graduated six hundred less students, I should have said that his plan of education for this specialty is the only one to follow. It is certainly the most ideal. We are, however, in a transition period, and there are not enough dental graduates to serve the masses. The few are always well served, but they need not take up all of our time. If we desire to do justice to the poor and their children, a compromise must be made. Are we to let them suffer for the sake of defending an ideal? I for my part say No.

A dental nurse trained on the lines

suggested by Dr. Rhein or educated at a college sufficiently to comprehend not only the technique but the scientific and humane importance of prophylaxis would best serve the purpose at this juncture of prophylactic evolution. When the day of readjustment arrives, the dental nurse may have to make her exit. When the evolutionary period is passed, a change can be more readily effected. What is ideal today may not be ideal tomorrow. If we desire to reach the multitude by this grand process of prophylaxis, we must have additional help from some source, or let the multitude suffer. If we desire to give the poor the blessings of this dental development, we may have to sacrifice a small fraction of our educational ideals, but in spite of the imperfection which would be inherent in this change, it would carry the blessing of health to millions who are now deprived of it.

Dr. J. L. KELLY, Chicago. It does not seem so much a question of better training for this work as one of training those who are now in the profession to be more proficient therein.

In regard to Dr. Rhein's remark as to taking care of poor people's teeth, I believe that good teeth are as important to them as they are to the wealthy class, but in view of their inability to have a trained dental nurse it is practical to train them to do this work themselves. We can train each patient to clean his own teeth. In my opinion this idea of people running to dentists to have their teeth cleaned is absurd. First, the dentist should learn how to clean his own teeth—and few of them know how—and when he has mastered that, there is no question in my mind that he will be able to teach his patients to clean their teeth. If we are going to try to teach patients to clean their own teeth by using instruments, I do not see any necessity for trained dental nurses.

Dr. MEISBURGER. Dr. Kelly is entirely too modest in his remarks. I wish he would tell what he does in his own mouth, and why he never uses a toothbrush.

Dr. KELLY. About six years ago I had a very severe case of pyorrhea, and was given to understand that it was incurable, because constitutional. I lost all my teeth back of the first bicuspids, and the lower anterior ones also were loose. I did not believe, however, that all my teeth were doomed, and I started to clean them with an orange-wood stick, and ligated them. To my entire satisfaction and pleasure, I have them yet. I do not use a tooth-brush nor do any of my patients use one, and I do not believe that any of your patients will use one when they know how useless it is.

There are three reasons why the toothbrush should not be used. One reason is that the teeth cannot be cleaned with it; the second, that the brush cannot be cleaned; the third, that the teeth and gums are cut by it. Any one of these reasons would be sufficient to discard it. I believe that by wiping the mouth thoroughly with a cloth, the mouth can be made to feel cleaner, and more parts can be reached than with the brush; at least, the mouth will not be made worse than it was. Holding these views, I devised two years ago an instrument for carrying an ordinary dental cotton roll, with which I clean the mouth. The mouth should be cleaned as well as the teeth, which are not any more to the mouth than the face is to the body. The mouth should be cleaned three times a day, and the purpose of cleaning the mouth should be studied and our patients made to realize this purpose. We do not attempt to manicure our finger-nails without learning something about it, and the cleaning of the teeth is not as difficult if mastered. It does not require much time if the proper instruments are employed, and it should be done systematically.

When a patient first comes to me, I clean the lower six front teeth, as a rule, before I do any other work. I first stain the teeth to show the patient how useless his efforts were. This stain is composed of iodin, zinc iodid, glycerin, and water, and readily discloses the deposits, and stimulates the patient to be more thorough. I do not spend more than half an hour in cleansing the patient's teeth, but in this time I teach him how to clean his teeth, giving him a mirror while I use the little cotton-roll carrier on the lower anterior teeth. When he returns, I proceed to clean six more teeth, and continue this process until all the teeth are cleaned. It is surprising how many patients will adopt this method and clean their teeth very efficiently the first time. Recently I gave a patient just one lesson. He was a poor man, by the way. When he informed me that he could not afford to come as often as he thought necessary, I told him that he could learn to clean his teeth in one lesson. I told him that I would remove the heavy deposits, but the polishing he could do himself, and I insisted that he spend no less than two hours once a week. I was very much surprised when he presented the next time. It seemed as if an expert had gone over his teeth; they were perfectly polished, and he told me that he had spent three hours on them. Besides, he had practiced on his boy of ten years, had cleaned all his teeth, and had also taught his wife how to clean her teeth. Now, of course, he is an enthusiast, but I may state truly that seventy-five per cent. of my patients live up to these rules, and each spends at least an hour a week on the teeth, though I advise two hours. It is possible and practical, and it is only a question of time, in my mind, when people will awaken to the importance of oral hygiene and learn to clean their own teeth and mouths as well and as regularly as they clean other parts of their bodies.

Dr. Rhein. Both Dr. Fones and Dr. Hofheinz have made remarks which need some further explanation in regard to my position. Dr. Hofheinz said that in his opinion I err in claiming that a woman is more capable of doing this work than a man. The reason why I believe a woman to be more efficient for dental prophylaxis work—which is limited to the polishing of the teeth, to the dental ligament, to the incisal portions of the teeth—is because it is such drudgery, such monotonous work that all the men whom I have employed as assistants have relaxed in the conscientious efforts necessary to keep this work up to the highest standard. We all realize that it is one of the wonderful faculties of woman to do something over and over with the same degree of perfection, and that is the reason for my statement.

This is a period of co-operation in every respect; the evolution of our age has led to co-operation in all walks of life, and in no other field can better results be obtained by co-operative measures than in a dental practice which embraces so many different departments. Nevertheless, I have but little respect for the dentist who turns over his patients to his assistant, and after that only takes an interest in the financial return. I want to emphasize that this work must be kept under the practitioner's constant supervision.

I agree with Dr. Wheeler that it is absolutely unnecessary for any law to be passed permitting a practitioner to have this operation of drudgery done under his supervision by an assistant, no matter whether she be a trained medical nurse or not. Further than Dr. Wheeler, I claim that it is far better for us to follow the example that the physician has set us in the trained medical nurse, and start a school where women of a certain grade of education are trained for the performance of the duties that we require, so that these duties can be carried out according to the dentist's ideas who employs such a nurse and whose orders she is to carry out. These nurses are to carry out a prescription just like a chemist or a laboratory man. But, as you would not give your patient a piece of work that has been made by your laboratory man without inspection, for the same reason it is your duty to your patient to know what your office assistants are doing, and if they are not doing the work satisfactorily, you should teach them to do the work to your complete satisfaction.

Dr. Fones. Supposing it were possible to offer a course in the colleges for the training of women in this work, where would we get the women from to take this course? What incentive would there be for women to go to these colleges and become proficient? Would the dentist select some likely woman who in his opinion might become a prophylactic assistant, send her to college, and pay the expenses of her education? Not at all. This movement must develop, as Dr. Hofheinz has said, along evolutionary lines. We will have to start at the bottom round of the ladder, and prophylaxis must first be done by a few men here and there to try out results; other men will become interested in the procedure, and supply their offices with women of like attainments. I myself know the benefits of this treatment, and I hope the time will come when it will be perfectly feasible for poor people in any walk of life to enter an office where there is a woman skilled in this work and have a surface treatment of their teeth for the sum of fifty cents. If this condition ever comes to pass, we shall have the making of a new nation and a new standard of life.

Our dental laws were not made for our protection. They were made for the protection of the public, and if the legislators once realized what a benefit such treatments would be to the people at large, you can rest assured that the dental laws would be quickly adjusted so that these treatments could be readily obtained.

Dr. S. E. MacDougall, Buffalo. There is one phase of this question that has not been touched upon. It has been said that there are ninety millions of people in the United States, with only thirty thousand dentists to serve them. If there were a hundred thousand dentists in the United States, and the people were not better enlightened as to the value of dentistry in building up and conserving the human machine, there would be no more, or but a few more, dental operations performed than there are at the present time.

Happily the work of education has been inaugurated in a way that will have the most telling and lasting results, by teaching the importance of oral hygiene to the children in the public schools, by clinics and by free dispensaries. This method reaches a class which it is difficult to approach in any other way, and creates a demand for dental treatment that will have a far-reaching effect.

Comparatively few people know the value of prophylactic treatment and the value of dental operations for the conservation of the teeth, the invigoration of health, and the lengthening of life. Rochester can look with pride upon the pioneer work which has been done by its dentists in delivering lectures to the school children and by its free dental dispensaries. When this work is taken up as systematically and thoroughly by other cities, there will be such a demand for trained skill that the colleges will be filled to their utmost capacity with first-class talent seeking dental diplomas. First a demand must be created for more dental practitioners through the education of the public as to the value and necessity of dental treatment. This enlightenment will open a field that will attract many cultivators.

Dr. L. M. Waugh, Buffalo. I believe that the lowest round of the ladder has not been mentioned tonight. No one believes in prophylaxis more than I do. Personally I think that it is best conducted by the man who does his own prophylaxis work, together with all the other operations, the restoration of the proper form of the teeth, the contact points, etc. A great many dentists, in my opinion, are absolutely inefficient to practice prophylaxis, and this should be corrected before we begin to create a demand for such work. Statistics quoted tonight show that there are now thirty thousand practicing dentists, also that the eradication of eighty per cent. of oral diseases can be brought about by oral prophylaxis. If thirty thousand dentists at present are practicing oral prophylaxis improperly, think what could be done if they were doing it properly. Their efficiency could be raised eighty per cent. By educating them to practice prophylaxis properly, we should be able to increase their efficiency to such an extent that their efforts would equal the work of one hundred and fifty thousand dentists practicing in an inefficient way. In my opinion, first the dentist should be taught, and if he cannot take care of the work, let him get someone to help him out.

Dr. J. O. McCall, Buffalo. I would like to mention one point which does not seem to be clear to a great many, and that is the distinction between oral hygiene and oral prophylaxis. I have been very much interested in oral hygiene, which I understand to mean that we endeavor to make the mouths of the large masses of people reasonably clean, and endow them with a reasonable masticating efficiency. They should be enabled to prepare food properly for digestion, thereby raising the standard of health of the community. Oral prophylaxis is the science of the prevention of diseases of the mouth; it is a step beyond oral hygiene. Of course we want to prevent caries among the masses, but first we must put the masticatory apparatus of the masses in a reasonably clean condition, so that they can prepare the food properly for digestion. The proper use of the teeth will itself in time, through the forces of evolution, bring about natural oral prophylaxis in these people.

I do not interpret oral prophylaxis to mean simply the polishing of the exposed surfaces of the teeth. When a patient presents to me, I first consider not merely how much scaling and polishing there is needed, but what conditions in that mouth need correction, so that the polishing to be done subsequently will help to keep the mouth in proper condition. In other words, I study the occlusion, as with malocclusion no mouth can be kept in a perfectly healthy condition except by the most strenuous efforts. I find that it taxes my powers of observation to find out what is needed in each individual mouth and to select the means of correcting the conditions favoring disease. The polishing of the teeth, to my mind, is more or less a secondary consideration, and I am sorry that Dr. Rhein has not investigated the improved methods of conducting a prophylactic practice before making his statements.

As to prophylaxis assistants, I consider it feasible to employ trained women to do the polishing of the crowns of the teeth, if it is done under the supervision of the dentist himself. I do not believe that the majority of dental practitioners are sufficiently conversant with the methods and objects of oral prophylaxis to properly supervise such work, and until the profession itself is educated to that point, I would not favor the prophylaxis assistant. The time may come, however, when that plan may be a good one to adopt.

Dr. WM. W. BELCHER, Rochester. We have had so much oratory that the ordinary or garden variety of dentist might hesitate to enter the arena of this discussion, and to make it easier I venture as the first of this class. One point has been overlooked, namely, in regard to the preparation of the medical nurse. Where does she get her education? In the hospital she takes care of the patients under the direction of the attending physician, and incidentally some of the medical men on the staff give a short lecture. The medical nurse receives a three years' preparation; the larger part of this course consists in practical instruction in taking care of the patients. The first year she receives one lecture and one "class"—or a talk or instruction by the house physician or head nurse; the second year, two lectures and two classes per week; the third year, one class per week. The number of lecture courses given at the hospital varies from three to five, and this, together with the class instruction and the practical work at the bedside, makes up the course. Why cannot we offer similar instruction in connection with our free dental dispensary work—one lecture per day, to be delivered by some member of the board of directors, or one selected by them, the course of instruction to last one year? This, besides the practical instruction at the chair, would complete the course of instruction, admit the student to examination, and entitle her to a diploma if she be found proficient. I confess I have always wanted to be two things, a real professor and an editor. We started a little eight-page pamphlet in connection with our work at Rochester, and before long it had blossomed out into a real dental journal under my editorship. I should also like to be a professor. Why cannot we, with our free dental dispensaries, undertake the preparation of these nurses? This seems to me a very opportune starting-point.

A great deal has been said this evening about the monotony and the irksomeness of the work of properly cleaning and scaling teeth, the delicacy of touch required, etc. But think of the mechanic who is doing one thing not only hour after hour, but day after day! Think of the girls who are working in our factories at a beggarly wage, pasting on labels or filling bottles of baking powder day after day, with long hours, like a part of a machine, and with no care for their welfare. Some of these girls are graduates of high schools and better. When we think of such conditions, the cleaning of teeth is a joy. Why not employ such girls as dental nurses? Pay them a small salary, give them a year's training, and the problem is solved as far as suitable preparation is concerned. We are flaunting the high standard of preparation of the dentist of today as to be set up for the dental nurse, but did we begin with this high standard? When I attended college, there were no educational requirements, and a student did not have to be a high-school graduate. More often the students had not graduated from any school at all. To give you an illustration of the standard of the entrance examination at that time, one of the questions in geography was: "Name three large rivers." The answer was not confined to the United States; any old river in Europe, Asia, Africa, or South America would do.

It is this kind of material that half of the dentists who are present were recruited from, and most of them are good dentists. It is from that same material that we can recruit the dental nurse. It is all right to have high standards, to have educated men, but it is not absolutely essential that a man have a high-school education or better, to make a good dentist. I think a man will be a better dentist, all things being equal, with a college education, but many of the good dentists of today came off the farm, and have broken into dentistry by the back way and have made good. I think we could graduate these nurses in Rochester, and they would make good.

Dr. F. W. Low, Buffalo. Dr. Waugh mentioned a point that I feel should be impressed upon everyone present. I know from personal experience that I am taking better care of teeth in regard to oral prophylaxis than I did at one time. If I were not doing that, thereby improving my reputation more than in any other respect, it would result in my starving to death.

Dr. Hofheinz. Will you make that statement again?

Dr. Low. I said that I am taking better care of teeth than I once did, and in this way I am adding to my practice; if I did not have more patients, the decrease of caries in the mouths of such patients as permit prophylactic treatment as frequently as I think necessary is so great that I should starve to death. That I think is the common experience of every practitioner who undertakes carefully to treat teeth by the prophylactic method. A young woman has been in my employ for a number of years, but I want to say that a girl cannot be made a prophylaxis specialist in six months. After her several years' training, however, I should rather have that girl clean my teeth than to have half the dentists in this room do it, and I do not say this to discredit your ability and skill. Those of you who do not give prophylactic treatment to your patients at frequent intervals are not employing the right method of preventing caries.

Dr. Low. If you can make two blades of grass grow where there was only one before, you naturally become enthusiastic, and that is the experience of every practitioner who abandons the old rotary motion, using rubber cups and brushes in the dental engine, and employs an orange-wood stick and pumice to clean teeth properly. This talk about drudgery is all nonsense. Any operation, if continually performed, is monotonous, and I do not like to do any one thing all the time. I claim to be a general practitioner, the only branch of dentistry that I do not practice being orthodontia, because I could not afford to abandon my practice long enough to take a special course. I want to do all kinds of work, but there is no one branch that gives me more pride and pleasure than demonstrating to the patient, when I have finished operating, the use of the orange-wood stick, pumice, and Cutter tapes, with finally the application of phénol sodique on little pads made of Japanese bibulous paper, with which the teeth are nicely polished and the tissues surrounding them are properly massaged.

Dr. W. W. SMITH, Rochester. When Dr. Rhein brought this matter before the executive council of the state society in 1903, I voted very positively against his proposition. At that time I did not think it timely, and there did not seem to be any demand for it. Since then, either conditions or my views have changed very materially. It is not a question of what is best for any individual, but what is best for the masses of the people, and we, if we would be a liberal profession, should meet what is best for them.

I do not know the best method of procedure in this matter. Some are claiming that a regular course in dentistry is best, but possibly a hospital training would be better. Being one of the committee that Dr. Wheeler spoke of, appointed to formulate some plan to be presented at the next meeting of the state society, I feel very much interested. Within the last few days I have talked with the editor of a nurses' journal, also with the superintendents of two of our hospitals in Rochester. I asked them if they thought it a feasible plan to select a nurse with two years' hospital training (they have a three years' course in the Rochester hospitals), give her another year of instruction in this special branch under the supervision of the hospital and grant her a diploma as dental nurse, and then have an enactment which would give her the authority to practice prophylaxis in the office of a dentist. They thought this feasible, stating that at present a similar course was under consideration for nurses who wished to specialize in anesthesia, and suggesting that they could offer another course for dental nurses, or could make the third year elective.

After listening to some of the remarks tonight, I do not know whether such a course of training would be necessary; possibly it might exceed the requirements, and not meet our special demands.

I do not quite agree with Dr. McDougall that we must first create a demand. It seems to me that we already have the demand among the masses of the people. This has been impresesed upon me with particular force since I have been connected with dental dispensary work and have made examinations of children's mouths. We can meet the demand of the poor children who cannot afford to pay for dental service, but there is a class that can pay a moderate price, though not for the service of an experienced dentist, and if we would meet this demand, it must be either through the dental nurse or in some other way. It is not clear to my mind what the best plan would be.

Dr. RHEIN. Considering the work which the city of Rochester is doing, and their present facilities, the Rochester dispensary could easily be utilized as an efficient school for dental nurses. The dispensary patients represent the same material which the dental student meets in the infirmary of a dental college; with that material and a proper curriculum of lectures a better school for dental nurses could be established than in a dental college itself. These students, of course, would work on poor children in the infirmary under the guidance of demonstrators, as in dental colleges. They would become far more skilled than in an ordinary hospital, because the conveniences of hospitals are not of such a nature as to make this teaching nearly as feasible as it can be made in a dental dispensary.

I am so much interested in this movement that if I can be of any assistance to Dr. Smith and Dr. Belcher at their dispensary at any time, I am at their service, and I believe that Rochester could make a record for herself in this particular regard.

Dr. LOUIS MEISBURGER, Buffalo. In Dr. McDougall's opinion the time is not ripe as yet for engaging assistants in our offices for prophylactic work. Dr. Fones, on the other hand, tells us that a practitioner is swamped with prophylactic work, and that a dentist who would serve his patients honestly and conscientiously must give them prophylactic treatment. But, if a practitioner is swamped with these cases, what is he to do with the rest of his work? If he engages a graduate assistant, the result will be that his income is cut in halves. We cannot work for the love of our profession entirely. The successful practitioner today is he who loves his work and his profession, but when a man is almost spent, his work necessarily grows less, because his vitality is ebbing. I have listened with a great deal of pleasure to Dr. Hoff's paper, and his prophecies for the future, but does he present conditions as they exist at the present time?

I have asked a colleague whom he would consider more competent to practice prophylaxis—the graduate from the dental school, or the assistant who has been in a dental office four or five years and has had special training along special lines. He replied that by all means he would prefer the assistant who has had the special training. While I would not criticize, or advise any man to break the laws of the state of New York, yet I believe that a practitioner has every reason to employ a young woman in his office to do prophylactic work under his guidance and direction, and she can do it properly and in a perfectly thorough manner. The question, however, is where we are going to get assistants from. I do not believe that the graduate medical nurse knows anything about prophylaxis nor that the graduate nurse can step into our offices and do that work as well as a woman who has been under our instruction for some time, and I therefore think that a practitioner is perfectly justified to let his assistant do prophylactic work under his direction and supervision.

Dr. Kelly is entirely too modest in his remarks, but he tells us that seventy-five per cent. of our patients can take care of their teeth themselves. If that is a fact, why cannot a woman who has been in a dental office for four or five years do prophylactic work?

Why is it that the average dentist does not practice prophylaxis? Some years ago I had the pleasure, in company with Dr. Hofheinz, Dr. Line, Dr. Link, and a number of others, of visiting the office of Dr. Smith of Philadelphia, and after seeing the mouths of some of his patients who were undergoing prophylactic treatment, I was sufficiently stimulated to take up this work in my own practice. The reason why more men are not taking up this work is because, as Dr. Fones has said, they cannot engage a dental graduate who would be satisfied to do this work alone. The average graduate of a dental school has a higher ambition than confining himself to the cleaning of teeth prophylactically. That is my impression of the graduate of the dental school, and I do not believe that he is as competent to do this work as is the office assistant, who, under proper instruction, can do it most beautifully.

Dr. WAUGH. It has been said that oral prophylaxis increases the work that is to be done in patients' mouths, and again that it reduces the amount of caries by eighty per cent. It does not increase the work, it simply changes it from reparative to preventive work, and if a practitioner has to do eighty per cent. less of reparative work he will be able to take care of more patients. He is not making more work, but simply changing the nature of the work in each individual mouth. In my experience, prophylaxis work has reduced the number of fillings and pyorrhea cases.

As to the question of the assistant polishing teeth, I wish to say that an assistant may harm a tooth in polishing its enamel surfaces, since one who is not perfectly familiar with the anatomy of the tooth can very readily expose the dentin at the cervical junction of the enamel and cementum, producing hypersensitivity all over the mouth, and necessitating the extirpation of pulps.

In my opinion, we are not increasing our work, but shifting the nature of the work, and ultimately increasing our capacity for taking care of more patients.

Dr. HOFF (closing the discussion). This has been a wonderfully interesting and enlightening discussion and has probably modified our views somewhat.

I should like to take up the different statements that have been made and discuss them at some length, but on account of the lateness of the hour I cannot impose upon you to that extent. I shall have to fight this matter out with Dr. Fones and Dr. Rhein privately.

The different views in regard to this subject in its different phases and bearings seem to be due to the fact that we are coming to realize that this is a larger and more important subject than we are accustomed to consider at our usual meetings. This subject involves a question of policy, which perhaps cannot be settled definitely until it has been more thoroughly considered.

Dr. Rhein seems to think that most of our statements are to be considered from a narrow professional standpoint of selfish interest, and I certainly do not share his opinion at all. My whole career and professional life has been one of devotion to my profession, not because I love my profession in a narrow, selfish way, as he seems to fear some of us do. My profession has done more for me than anything else in this world, and it has satisfied my ambition in life. I feel that I could not have used my life to better advantage had I gone into the ministry, or into law or medicine or any other calling. This is one of the reasons why I am so jealous and sensitive in regard to the standards of my profession. All my life I have taken the position that I was not in dentistry from a selfish motive, but with the desire and for the purpose of serving my community as best I could. I know that Dr. Rhein is also sacrificing his life and even his personal welfare for the interests of his patients, and does it unstintingly. He would be glad to do the same for the unfortunate people of his own community if it were required, and many of our most ethical men are rendering similar unselfish services. We are not in the profession for what we may get out of it, neither are we trying to corner things, or form a trust for our own personal aggrandizement.

I think you will be willing to admit that I have an interest in this subject other than simply to exploit my own idea as to the training of office assistants on the lines which I have advocated.

There is a crisis impending on the profession, which we are only beginning to feel just now, but in the next few years we shall feel it in its full force, and I fear that we are going to be unprepared to meet it, unless we devise some efficient means. That is the reason why I am so anxious to have some policy adopted as soon as possible for meeting the emergency which, it seems to me, is coming very rapidly upon us.

I am not so hide-bound or dogmatic as to wish to have my own way in this matter. The reason I presented this paper is that I thought this an opportune occasion for starting the discussion on this important subject. I hope that everyone present will consider this question seriously, and if possible formulate some plan or system of solving this problem.

I wish I had time to give you my idea of oral prophylaxis and hygiene, and the difference between these and the "cleaning of teeth," as it is ordinarily considered in discussions of this subject. This difference is as great as that between the extraction of a tooth under ordinary circumstances and the practice of oral surgery or complicated therapeutics. The definition of oral prophylaxis which Dr. McCall gave, comes more nearly up to my ideal, and that is why I do not believe it possible to educate any person such as a trained nurse to do this important work. If this question simply involves the keeping of exposed tooth surfaces free from extraneous deposits for the purpose of preventing disease in that way, why not turn it over entirely to the chemists, who today are supplying the market abundantly with all kinds of toilet preparations, mouth-washes, tooth-brushes, and everything of that kind needed. If it is simply a question of cleaning the teeth, why should we bother with it at all? Why instil the question of training into it? We can have the mere cleaning of teeth taught in our public schools. But, if we must go a step farther and engage trained nurses or office-trained assistants, who simply scale and polish the exposed crowns of teeth, then I am willing that such a person should be trained in any way you please, individually or in dispensaries, in hospitals, or any other place; but no attempt should be made to attach such persons to the profession, because I do not believe that to be proper, and should resent it most earnestly. Neither the profession nor the people to whom we are endeavoring to minister would be benefited by such a procedure, nor could this crisis be effectively met or our moral and legal obligations properly discharged.

I should like to discuss a number of points in the argument advanced by Dr. Rhein as to the irksomeness of this work, and as to women dropping it because it is irksome, and because they would rather get married. I think it is a woman's duty to get married, and I think she ought to be willing to drop almost any profession to do that at the proper time. But I am confident that the woman who professionally educates herself for this work will be most loyal to it. I wish to say for Dr. Rhein's benefit that the lady to whom he referred as having given up the work in order to get married expects to resume practice on the first of January, and she says she never will be really happy and contented until she gets back to this work again. Do you think that a partially trained tooth-cleaner would feel that way?

I am very glad to have heard tonight the expressions of confidence and even of affection in which some of you hold your women office assistants. It is, in my opinion, one of the strongest arguments in favor of my plans, that these office assistants are capable and worthy of your confidence and your very highest personal respect for their patient and faithful assistance. Anybody who is doing work in a noble, high-minded, and comprehensive way is worthy of the highest respect and esteem. If these women can become so faithfully attached to their work with only a limited sphere of usefulness, what may we not expect of them if they are given a complete education and an unlimited field of ministry and responsibility. Unless our office associates do their work with enthusiasm and interest, it will be perfunctory, tiresome, and irksome. It will then be like the man's work to whom Dr. Belcher referred, who sits at a table day in and day out labeling cans. I presume that even such a man becomes attached to his work finally, even though it does not offer the same opportunity for loyal interest as would dental prophylaxis. I believe that you will find that any woman who becomes interested in this work without having had a thorough preparatory education, and makes a success of it, will have the one regret that she is not an educated and legalized dentist. In my opinion we should be doing an injustice to these assistants by setting them to work before they are prepared for it, when we might just as well give them an education which would enable them to reap the full benefit of their genius, talent, and interest in the work.

I know, of course, that the trained nurse who is enthusiastic in this work is capable of doing untold good, and may be most efficiently utilized not only in a private practice, but especially in benevolent ministrations. I should like to make a plea of humanitarianism, sympathy, and love for the masses of unfortunate people.

Dr. RHEIN. How are you going to serve the masses?

Dr. HOFF. Serve them, for the present, because we can do no better, in the way you suggested here tonight, by simply having the surfaces of their teeth cleaned by trained helpers.

Dr. RHEIN. But you say that you do not want to recognize these assistants.

Dr. HOFF. Not as members of the profession, doing professional services. I do not think that we are morally or legally justified in attaching such helpers to our staff. Professional relations are not only confidential but they are sacred, and they cannot be delegated to the unlettered and unskilled without jeoparding our professional standards.

The meeting then adjourned until Saturday afternoon at 2 o'clock.

SATURDAY—*Afternoon Meeting.*

The meeting was called to order on Saturday afternoon at 2 o'clock by the president, Dr. Luther.

Dr. H. L. **Wheeler**, New York, read a telegram from Dr. Howe, commissioner of health of New York, announcing the appointment of Dr. W. W. Belcher, Rochester, as lecturer by the state board of health.

The next item on the program was a lecture on "Hereditary Syphilis," by Dr. **Grover** W. **Wende**, Buffalo. Dr. Wende gave a very interesting lecture on the subject of hereditary syphilis and its relations to the practice of dentistry, also showing the disease in its various stages by the exhibition of a number of lantern slides.

There being no further business, the president, Dr. Luther, declared the meeting adjourned until the next annual session.

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EDITORIAL DEPARTMENT.

TWO NOTABLE BENEFACTIONS.

On June 4th the cornerstone of the building for the Forsyth Dental Infirmary for Children was laid with appropriate ceremonies by John Hamilton Forsyth, who with his brother, Thos. Alexander Forsyth, founded the infirmary and provided a munificent endowment for the perpetuation of its work as a memorial to their deceased brothers, James Bennett and Geo. Henry Forsyth. The object of the infirmary as expressed in the words of its president, Thos. A. Forsyth, is—

> to bring about a stronger and healthier generation, which it is purposed to accomplish by caring for the children's first or temporary teeth preparatory to the advent of the permanent teeth, and to also care for children's adenoids and the tonsils, so that when they reach the age of sixteen years, they will be in good physical condition. When this infirmary is completed it will be the first of its kind in the world, and we are satisfied that the good work it will accomplish will serve as a pattern for other cities in this country as well as abroad.

Mayor Fitzgerald of Boston, in the course of his remarks in speaking of the institution, said:

> It springs up at a time when child hygiene has become more and more recognized in the department of medical science. We realize now that the health of the adult is based upon the environment and experiences of childhood. The schoolroom of today is incomplete without frequent visits from the doctor and the nurse, and lately we have gone farther, and undertaken to educate the people to a knowledge of the laws of health by visitation at their homes. The recent examination of school children in this city disclosed a serious percentage of dental defects, and modern science warns us that this condition, formerly regarded as negligible, affects more than we realize the general health as well as the physical beauty and expression of the population. Degenerative conditions of city life impair vitality and bring about that early decay of the teeth which, I am told, renders the population in certain European capitals so unpleasing to the visitors. Fortunately, in this country we have not progressed so far on the downward path, and the establishment of a specialized hospital like the Forsyth Dental Infirmary, in which unsound teeth can be preserved and facial deformities corrected, promises much for the welfare of the coming generation. This institution will, I understand, address itself particularly to childhood, and forestal that tendency to decay and irregularity which, in a minor way perhaps, has contributed to ill health and unhappiness in tens of thousands of lives. The motto of the infirmary indicates that it is "Dedicated to the Children," and in these four words knowledge and kindness find a perfect union. Science tells us that the care expended upon the health of the child is an investment that can never be equaled at any later period.

Not only to our colleagues of the city of Boston, but to the dental profession everywhere, the materialization of this broad-minded philanthropic conception, resulting in the creation of the Forsyth Dental Infirmary for Children, must be a source of deep and increasing satisfaction. The material good which will necessarily be the outgrowth of the activities of the institution will constitute but a part, albeit an evident and important part, of its beneficent work. Its greater achievement must be the materialization of the idea which it represents, and the influence which the propagation of that idea will exert, not only for the benefit of the dental profession, but for humanity at large; for the institution will be a physical realization of the importance of preventive medicine—of the fact that the science of cure is but a minor division of the science of hygiene; that medicine will not have accomplished its full mission, nor performed more than a fraction of its duty, until it shall have solved the problem of the prevention as well as of the cure of disease. Moreover, the Forsyth

Infirmary will constitute a tangible recognition of the fact that in the great problem of disease prevention the hygiene of the mouth and its contained organs, the health of the portal of the human body, is destined to play a leading part. The general recognition of this fact, which must surely follow the successful carrying into effect of the purposes of the Forsyth foundation, will just as surely bring about in due course of time a general recognition of the fact that dentistry, in its larger and proper relationship, is a specialty of the science and art of healing second in importance to no other.

Of equal or possibly more far-reaching importance to the dental profession upon its educational side is the culmination of a co-operative affiliation between the Thomas W. Evans Museum and Institute Society and the Trustees of the University of Pennsylvania, which was officially executed on June 15th, whereby the resources of both institutions will be utilized in the creation of a dental educational institution for the purpose of effectively carrying out the clearly expressed intention in the will of the late Dr. Thos. W. Evans of Paris, France. As the Forsyth Infirmary is the first example of a large benefaction devoted to public dental service, so also does the Thos. W. Evans benefaction constitute the first large endowment of dental education. The state of development of the public mind which made it possible to secure for the needs of public dental service so notable an endowment as is represented by the Forsyth foundation carries with it a deep significance as to the need of a more extensive and thorough educational preparation for those who are to become the exponents of dental science and art in the immediate future; and it is equally significant and equally propitious that the material resources essential to the expansion and development of our educational facilities so that they will be available for those who are to undertake the work involved in the larger future demands upon the dental profession are now amply provided.

The history of dentistry has not hitherto recorded any such important and significant indications of the recognition of its claims to serious attention as an important department of the science and art of healing as are expressed by the two benefactions here under consideration.

THE ADMINISTRATION OF ANESTHETICS BY UNQUALIFIED PERSONS.

THE following letter, with the appended opinion of the Attorney-general of Ohio, as published in the *Lancet-Clinic*, Cincinnati, Ohio (April 20, 1912, page 446), will be read with interest, not only because of the general importance of the issue discussed, but because of the fact that it brings into prominence a distinction as to the legal responsibility of the practitioner of dentistry when administering anesthetics for strictly dental operations and for general surgical operations respectively:

Anent Nurses and Dentists as Anesthetists.

COLUMBUS, O., March 30, 1912.

EDITOR LANCET-CLINIC:

I read with great interest and hearty approval your recent editorial objecting to the employment of nurses as anesthetists. The matter was brought up before the house committee of the Grant Hospital a good many months ago, and long before the opinion had been rendered by the Attorney-general. The committee unanimously felt that the responsibility of the anesthetist was second only to that of the operating surgeon, and that even if a nurse could become thoroughly trained in the administration of anesthetics, if any accident occurred the surgeon would be held responsible both morally and legally. Of course, emergencies arise occasionally, when a physician is far removed from professional assistance, and when he must depend upon a nurse or even a neighbor to continue the administration of the anesthetic while he is performing the necessary surgical or obstetric manipulations. Those cases, however, are entirely distinct from what we are now considering. If, as has been more than once suggested, some of the surgeons who thus employ nurses charge a large fee for the anesthetist, but pay the nurse only a minimum salary, the matter then becomes one of absolutely indefensible graft, pure and simple.

Whether dentists would be regarded by the Attorney-general as eligible anesthetists is another proposition. Personally, I should feel that the training of the dentist in the use of nitrous oxid for extracting purposes has been such, and the custom of its administration by dentists so long established, that he would be legally responsible as an anesthetist to that extent. If we go beyond that, however, into the domain of anesthesia for general surgical purposes, another proposition is presented which I would not feel competent to decide. That matter also was brought up before our house committee, on the application of a dentist to become anesthetist, and we decided adversely, fearing that if any misadventure occurred we would be held responsible. From what I can learn generally, students in the better dental schools receive fully as much instruction in the administration of anesthetics as do medical students in corresponding medical schools. There is a rapidly growing feeling, however, in the profession, that every medical student should receive some practical experience in the administration of anesthetics before he is permitted to graduate. Such experience, however, in many medical schools is impossible, though it could be secured undoubtedly in most.

The dentist to whom I allude above has sent out cards, I presume to all the doctors, announcing that he has given up dentistry and will hereafter devote himself to giving nitrous oxid and oxygen for surgical operations, and in addition doing some minor oral surgery. He puts "Dr." before his name, but on inquiry I find that he is not an M.D.

I am rather inclined to concede that dentists would be permitted to give nitrous oxid for the extraction of teeth, but I am not prepared to concede that they could so far practice medicine as to give anesthetics for general surgical operations.

I think you had better take this matter up with the Attorney-general. He gave an opinion, you will remember, in regard to the nurses, and I presume would be glad to give you an opinion as to the privileges and immunities of dentists. Of course his opinion is not binding at all, but it creates merely a strong presumption, and if I were in the place of any surgeon using nurses as anesthetists I would promptly desist, since in the case of a suit for malpractice the adverse opinion of the Attorney-general would have great weight with the jury, and I would not wish to assume the responsibility.

If you get Attorney-general Hogan's opinion, you would perhaps publish it in the same issue in which you publish my article.

J. F. Baldwin.

[Dr. George H. Matson, having requested and received the opinion of Attorney-general Hogan, has kindly forwarded the same for publication.]

OPINION.

April 4, 1912.

Dr. George H. Matson, Secretary, State Medical Board, Columbus, O.:

Dear Sir,—Under date of February 26th you submit for my opinion the question of whether or not regularly qualified dentists are permitted under the laws of this state to administer anesthetics under the direction of a registered surgeon, or for surgeons at surgical operations.

I assume from the above question that you mean operations other than incident to the practice of dentistry.

Under date of April 14, 1911, I have given it as my opinion that administering of anesthetics unquestionably constitutes the practice of medicine and surgery, and that, therefore, it is not lawful in this state for a person who is not a registered physician to administer anesthetics, even under the supervision of a registered physician.

While it is true that, under the law relating to examination for registered dentists, it is necessary that such applicants for license to practice dentistry shall pass a satisfactory examination, among other subjects, on the subject of anesthetics, yet as I view the provisions of said section, it relates solely to an examination for the administration of anesthetics in purely dental cases.

Section 1287, General Code, provides: "This chapter [to-wit, the chapter relating to the practice of medicine and surgery or midwifery] shall not apply to . . . . a regularly qualified dentist when engaged *exclusively* in the practice of dentistry."

As I am clearly of the opinion that the requirement that an applicant for license to practice dentistry in this state shall be examined in the subject of anesthetics applies solely to the administering of anesthetics exclusively in the practice of dentistry, and as I am of the opinion that the administering of anesthetics in surgical operations is a practice of medicine and surgery, and as Section 1287, General Code, specifically exempts regularly qualified dentists when engaged exclusively in the practice of dentistry, I am of the opinion that it is not lawful for regularly qualified dentists to administer anesthetics under the direction of a registered surgeon, or for surgeons at surgical operations not incident to the practice of dentistry.

Very truly yours,

TIMOTHY S. HOGAN, *Attorney-general.*

BIBLIOGRAPHICAL.

ORAL SURGERY: A TEXT-BOOK ON GENERAL SURGERY AND MEDICINE AS APPLIED TO DENTISTRY. BY STEWART LEROY MCCURDY, Professor of Anatomy and Oral Surgery, University of Pittsburgh; Orthopedic Surgeon, Presbyterian and Columbia Hospitals, Pittsburgh, etc. With 228 illustrations. New York and London: D. Appleton & Co., 1912.

Dr. McCurdy's book fills a want that has been felt for some time. It includes practically all of the general knowledge of surgery required by the dentist, and is well balanced in that the author does not devote too much space to exploiting special hobbies.

The chapter on Syphilis is up to date, except that details of salvarsan treatment might have been further elaborated.

The importance of conservative treatment in the preservation of function and cosmetic effects is well set forth in the chapters on Lesions of the Jaw-bones. It is hoped that the author's advice in regard to the present indiscriminate use of hydrogen dioxid will be followed.

In the chapter on the Maxillary Sinus, insufficient attention is called to variations in the size and shape of the cavity. Fig. 172, taken from Cryer's "Internal Anatomy of the Face," is used to illustrate the dogmatic statement that "The antral cavity does not extend internal to the internal surface of the alveolar process above the molar teeth." Many illustrations could have been taken from the same book to prove otherwise. The illustration in question is made from an old negro skull, and was primarily intended to represent the thinness of the walls of the maxillary sinus in old age. The point here illustrated by it is an exception just as much as it is a "law."

Transillumination, recommended as a method of diagnosis in antral diseases, is now regarded as unreliable by those who have made a special study of anatomical variations of the pneumatic spaces of the face. The X ray, which has practically replaced transillumination as a method of diagnosis, is not mentioned here in the text, although two good skiagraphic illustrations are shown.

Very little space is devoted to the important subject of impacted teeth, particularly as to diagnosis and indications for operation.

In the chapter on Neuralgia, insufficient consideration is given to diagnosis with a view to separating cases in which a local cause can be found and removed from those requiring operations on the nerve itself. The intra-oral method of reaching the infraorbital nerve is not mentioned.

We regret to see one with so much experience in this specialty advocating the fixation of fragments in fracture of the mandible by wiring the bone. This would not be surprising in a general surgeon with little knowledge of local mouth conditions, but coming from one with the author's experience as an oral surgeon it is hardly credible, when such excellent methods are available as fixation through the teeth by means of metal mandibular and mandibulo-maxillary splints. Wiring the bone is only justifiable in those rare cases in which there are no teeth to serve as attachments for the splints mentioned above, even where displacement of the fragments is great.

There is no chapter on surgical anesthesia, which surely should be included in every text-book of surgery.

The last chapter, on The X Ray in Oral Surgery, by Dr. Geo. C. Johnston, is chiefly devoted to details of technique. A little more on this subject from the standpoint of the clinician would have greatly enhanced its value.

An Appendix, containing a list of questions drawn from each chapter, should appeal to students.

The illustrations, while as a rule fulfilling their purpose, are not quite up to modern high standards. Fig. 113, intended to represent an impacted lower molar, will not be read as such by those familiar with skiagraphs of the jaws. The tooth apparently impacted is above the level of the alveolar ridge, and is on the opposite side from the tooth shown in front of it in the picture. Fig. 114, intended to represent four impacted teeth in one case, shows only one, possibly owing to faulty reproduction. Fig. 122 shows an anomalous condition of the premaxillary bone, which usually contains the germs of both central and lateral incisors. Fig. 123 is headed "Cross section of face," while it should read "Sagittal or antero-posterior section."

However, the faults pointed out do not detract greatly from the value of the book as a whole, and it can be recommended both to the dental student and to the specialist in oral surgery.

ROBERT H. IVY.

REVIEW OF CURRENT DENTAL LITERATURE.

[*Proceedings of the Royal Society of Medicine, Odontological Section,* London, March 1912.]

SOME NOTES ON THE DATES OF ERUPTION IN 4850 CHILDREN UNDER TWELVE YEARS OF AGE. BY W. W. JAMES, F.R.C.S., L.D.S., AND A. T. PITTS, M.R.C.S., L.D.S.

This investigation into the dates of eruption of teeth has been conducted at the hospital for sick children, Great Ormond st., London, upon all the children who attended the dental department during a period of about five years. The age limit of these children did not permit of extending this investigation beyond the age of twelve, when attendance automatically ceases. Nearly 7000 new patients were examined, of whom 4850 showed permanent teeth present or erupting, and upon which these data are based.

The method of recording was rendered constant as far as possible, one of the writers always making the examination of the teeth, while the other recorded the results. The condition of the eruption of each tooth was noted in five stages: First, tooth just erupted; second, less than half of crown erupted; third, rather more than half of crown erupted; fourth, tooth almost fully erupted; fifth, tooth completely erupted. The complete eruption of a tooth was judged by the following characteristics: The crown of the tooth projects so that all the enamel is exposed except that portion covered by the free margin of the muco-periosteum (gum). The root of the tooth is firmly planted in the alveolus, which should be on a level with the neck of the tooth. The peridental membrane is completely developed. The gum is firmly bound down to the bone, presenting a thin, even margin in close contact with the tooth immediately beyond its continuation with the peridental membrane. Hypoplastic conditions were also carefully noted. From a comparison of numerous charts the following table has been compiled, and may roughly be taken as the average date at which the teeth appear:

	Yrs.	Mos.	50 per cent. present.	
At	6	0	Lower 1st molars	
“	6	3	Upper “ “	
“	6	6	Lower central incisors	
“	7	6	Upper “ “	(*a*)
“	7	6	Lower lateral “	(*a*)
“	8	9	Upper “ “	
“	10	0	“ 1st bicuspids	
“	10	6	Lower “ “	(*b*)
“	10	6	“ canines	(*b*)
“	11	0	Upper 2d bicuspids	
“	11	9	“ canines	
“	12	0	Lower 2d bicuspids	(*c*)
“	12	0	“ “ molars	(*c*)

After 12 (say 12 yrs. 6 mos.) Upper 2d molars

(*a*) In upper central incisors 100 per cent. is reached six months earlier than in lower central incisors.

(*b*) 100 per cent. is not reached in either case.

(*c*) Upper second bicuspids commence earlier and show a larger proportion, although 100 per cent. is not reached.

It is realized that data based upon so comparatively small a number of cases as 4850 are open to criticism, and also that the age limit of twelve years somewhat reduces the value of these observations; yet it is believed that these results have been obtained with sufficient care to render them of use in determining more precisely the relative dates of eruption of the permanent teeth.

The authors are to be most heartily commended for their painstaking work, which proves what a fertile field for scientific observation dental dispensaries and clinics offer, and which is surely worthy of emulation by the American profession, according to the motto: “Observe, compare, reflect, record!”

[*New York Medical Journal*, New York, April 20, 1912.]

RANULA AND ITS TREATMENT. By L. G. Hanley, M.D., Buffalo, N. Y.

Ranula denotes a cystic tumor beneath the tongue, due to obstruction and dilatation of the sublingual or submaxillary glands or of a mucous gland. The cause of the obstruction may be some congenital condition, entrance of some foreign body causing occlusion of the duct, pressure from growths outside the duct, or mucus that has hardened and contains the salts of calcium. The plugging is generally gradual in its formation excepting in the acute form, which comes on suddenly during mastication, when the salivary duct becomes blocked by particles of food or some foreign body. The acute form is very painful, the secretions being pent up to such an extent that relief is sought at the hands of the surgeon. As much as six ounces have been removed by the author in one acute case. Ranula most often occurs in adults, but is sometimes found in children. Besides the sublingual and submaxillary, there are also the incisive ranula, which comes under the frenum of the tongue and causes it to spread, and ranula of Nuhn and Blandin, situated under the tip of the tongue. The treatment consists in removing most of the wall, and suturing the edges of what is left to the mucous membrane. A salivary ranula, many authors claim, requires excision, which can be performed in most cases *per os,* while a submaxillary ranula bulging externally should be removed by operating below the jaw.

A practical case is reported in which the cure was effected by opening on the inside. The patient had noted evidence of a tumor fifteen years before; the swelling gradually increased for about ten years, when it ceased, increasing in size until November 1910, when it became so large that it interfered with the patient's breathing and deglutition. He complained of headache, night-sweats, and loss of weight, and was suffering from septic infection. The tumor was opened from the inside, and over four ounces of calcareous deposit were removed, the cavity being washed with a weak iodin solution. A month later, he returned in a worse condition than before, with a temperature of 104° F., a pulse of 120, semi-delirious, and in great agony. Another incision was made on the inside, when five ounces of fetid pus escaped. The wound was kept open, and the cavity irrigated with iodin solution at different intervals until January 1911. No recurrence has occurred.

[*Deutsche Zahnaerztliche Zeitung*, Berlin, December 3, 1911.]

THE "AGING" OF VULCANITE RUBBER, ITS CAUSES AND PREVENTION. By Dr. L. Jung, Berlin.

The "aging" of vulcanite rubber is due partly to oxidation, partly to a decomposition of the sulfur compound in the rubber formed during vulcanization, an efflorescence of sulfur being frequently noted. By oxidation the rubber becomes soft and unduly ductile, and loses its elasticity, finally becoming viscid. The decomposition of the rubber-sulfur compound renders the vulcanite hard and brittle; on the surface frequently a white powder is observed consisting of sulfur, sometimes of other mineral admixtures. Oxidation of vulcanite undoubtedly involves a decomposition of the rubber-sulfur molecule, while the efflorescence of sulfur and the hardness and brittleness of the vulcanite resemble more a dissociation. The chemical and physical processes upon which vulcanization is based are by no means clear, and the question as to whether in vulcanization a chemical reaction or a process of absorption takes place has not yet been decided. Practical experience, however, has shown means of retarding the aging of vulcanite. Organic admixtures, such as ceresin, paraffin, sulfuretted oils, etc., seem to have little or no influence upon the aging of rubber, while the resins contained in natural rubber—partly due to the manipulation of the juice of the original plants, partly due to certain enzymes from the plant which have not been completely removed—decompose the crude rubber and form resinous products—partly due to careless transportation of the raw material—disturb the process of vulcanization, and probably also contribute to a more rapid decomposition of the vulcanite.

Mineral admixtures have a great influence upon the aging of vulcanite, especially sulfur compounds, with the exception of antimony pentasulfid, which is a suitable admixture accelerating vulcanization and rendering it uniform and perfect. Its red color facilitates the dyeing of rubber, while other dyestuffs generally lose their color during vulcanization, or else decrease the durability of rubber. A surplus of antimony pentasulfid is detrimental, however, for if completely vulcanized, rubber containing such a surplus loses elasticity, or, if under-vulcanized, it continues to vulcanize at ordinary temperature, with the same results as in the former case.

The admixture of too little sulfur or antimony pentasulfid or insufficient vulcanization of a correct mixture of rubber and either of these minerals renders the vulcanite product readily perishable. Light, especially strong sunlight, is the worst enemy of vulcanite, light producing a chemical process the opposite of that of vulcanization, *i.e.* "aging," by destroying the rubber-sulfur compound. Heat and moisture exert an influence similar to that of light, starting or hastening chemical processes. Insufficiently vulcanized rubber gains in elasticity and durability under the influence of heat up to the point when the vulcanization is complete. When this maximum is obtained, however, the detrimental influences of heat become apparent. Low temperature and dryness cause vulcanite to become hard and brittle, probably owing to a dissociation of the rubber-sulfur compound, crystallization and efflorescence of the sulfur. Inorganic admixtures also are dissociated, and appear on the surface of the vulcanite piece in loose powder form. Dryness deprives vulcanite of the moisture contained therein, which is absolutely essential to its elasticity.

Vulcanite pieces should therefore be kept in dark, dry, yet not too dry places, at about room temperature. Unvulcanized rubber is to be treated upon the same principles, and should be protected against heat especially, since otherwise premature vulcanization ensues.

[*New York Medical Journal*, New York, April 13, 1912.]

LEUCOPLAKIA BUCCALIS, WITH REPORT OF THREE CASES. By R. H. Ivy, M.D., Philadelphia.

Ivy reports three cases of leucoplakia buccalis—which he considers by no means a rare disease—all of which had three points in common, namely, absence of any history or clinical evidence whatever of syphilitic infection, non-involvement of the tongue, and tendency to epitheliomatous degeneration.

The etiology of leucoplakia is obscure, the condition having been ascribed to syphilis, gout, excessive use of alcohol and tobacco, either by chewing or smoking. The great majority of cases occur in men. None of the above-mentioned diseases, however, can really be put down as direct etiological factors, since leucoplakia is seen in people who have had neither syphilis nor gout or who have used neither alcohol nor tobacco to excess, though many are seen in whom these conditions undoubtedly tend to aggravate the disease. For instance, a patch will often start where a pipe-stem habitually impinges. It is interesting to note the almost universal attribution of leucoplakia to syphilis by writers on the subject. Ivy, therefore, has carefully looked for any evidence past or present in the few cases under observation, by going into the history, by physical examination, and by laboratory tests. The conclusions drawn from these cases are against the syphilitic nature of leucoplakia, for the following reasons:

(1) The large proportion of cases in which the patches occur without signs of any syphilitic lesion past or present elsewhere in the body, and in patients denying syphilitic infection. The statements of patients on this point, however, cannot as a rule be accepted without reserve.

(2) Failure of the lesions to respond to any form of antisyphilitic treatment. Indeed Housgains, a strong believer in the syphilitic origin of leucoplakia, admits that potassium iodid aggravates the condition, and tends to hasten the onset of epithelioma.

While it would be going too far to draw definite conclusions from so few cases, yet the negative Wassermann reaction in two in which the lesions were so marked is fairly strong evidence that they were not of syphilitic origin. The Wassermann reaction is positive in a very large proportion of cases of all stages of syphilis, and also in parasyphilitic lesions; so that, if leucoplakia is to be regarded as syphilitic or parasyphilitic, the great majority of cases should give a positive Wassermann reaction. Negative reactions indicate very strongly that syphilis had nothing to do with the causation of these particular cases at least, and that at any rate all cases of leucoplakia are not due to syphilis, as is so often stated. The performance of this test on a large series would throw a great deal of light on the relation of syphilis to leucoplakia, if any really exists.

It is probable that there is some as yet unrecognized factor making the oral mucous membrane in these cases more susceptible to irritation than in others. The irritation, be it smoking or chewing tobacco, over-indulgence in alcohol, or hot and spicy foods, tends to aggravate the condition. We do know that withdrawal of these irritating factors will often keep the disease at a standstill.

[*Tandlaegebladet*, Copenhagen, March 23 to April 13, 1912.]

ROOT-CANAL TREATMENT. By Viggo Andresen, Copenhagen.

Three methods of root-canal treatment are available: Sterilization, viz, amputation of the pulp with hermetic sealing of the root portions of the pulp; mummification, or some other form of sterilization of the pulp remnants by medicaments; extirpation, viz, removal of the cauterized or decomposed pulp body with broaches; mechanical cleansing and enlarging of the root-canals. All of these methods have innumerable modifications, and fanatic advocates and opponents. As usual, however, the golden middle path seems the safest, since every method has its indications and contra-indications according to individual conditions. Deciduous and anterior teeth, for instance, cannot be treated by the same methods as senile teeth, and posterior teeth, topographical conditions, the shapes of roots, etc., alter conditions. In no case, however, should the financial situation of the patient be allowed to influence the choice of the method employed, since regardless of remuneration the honor and reputation of the dental profession is at stake in every dental operation.

The author dispenses by a few appropriate words of condemnation with the methods of pulp amputation, sterilization, and mummification, and concentrates his attention to a description of the mechanical methods of root-canal treatment combined with suitable medication, and subsequent permanent filling of the roots with gutta-percha. The aim of every root treatment should be to remove, under aseptic precautions, all organic tissue, all imperfectly calcified or infected dentin of the canal walls, to prevent reinfection of roots and to seal them hermetically. The success of such root-canal treatment is necessarily based on an exact knowledge of the anatomic and histologic conditions of the field of operation. Guido Fischer has shown that our studies in this field are by no means concluded (see Dental Cosmos, June 1912, p. 722), and that root-canals very frequently diverge and break up into several openings at the apical foramen. Only by a highly cultivated sense of touch can the operator distinguish the point where his broach reaches this divergence of the canal or the layer of cementum which is thickest at the apical foramen. This periapical cementum possesses a remarkable faculty of reaction, and its vitality, combined with the breaking up of the single large root-canal into several smaller apical openings probably constitutes the chief means of defense of the organism against infection, and the operator's most powerful adjuvant to successful root-canal treatment.

Andresen gives a number of most practical hints in regard to pulp devitalization, treatment of gangrenous pulps, fistulas, etc., and sterilization, enlargement, and filling of root-canals. In order to secure complete filling of the root-canal, he recommends radicometry, viz, the measuring of the length of the canal by means of a sound and a small metal rule, and radiography.

[*Annales Dentaires*, Paris, February 1912.]

THEORY AND PRACTICE OF DENTAL ELEVATORS. By M. Franchette, Paris.

The most useful elevator, in the author's opinion, is the straight elevator, which should be specially adapted to the hand of each individual operator, its length to vary with the size of his hand. The average total length of the straight elevator is 135 mm., the handle measuring 70 mm., the shank 45 mm., and the blade 20 mm. The handle must rest in the palm of the hand, at the articulation of the scaphoid and trapezoid with the os magnum, rather more closely toward the last. When held in that way, the elevator can be manipulated most conveniently and naturally, following each movement of the hand. The shank and blade rest on the extended index finger, against which the elevator is pressed by the thumb, while the remaining fingers, gripping the handle and shank, rotate the instrument upon its axis in any desired direction. The more or less extended index finger regulates the length of the unguarded portion of the blade necessary for an operation. This method of manipulation prevents the accidental injury of soft tissues if the elevator should happen to slip, the index finger, by an almost unconscious movement, guarding the point of the blade and absorbing the force of the shock.

For cases difficult of access, three other elevators should be kept in the surgery; these do not differ from the straight elevator, except in regard to the angles of the blade. Two of these elevators have the blade inclined to an angle of 90° with the long axis of the instrument, suitable for obtaining access to lower roots mesially and distally. The fourth elevator is used for the extraction of upper and lower third molars, its blade forming an angle of about 45° with the long axis of the instrument.

[*La Stomatologia*, Milan, April 22, 1912.]

HISTOLOGICAL AND EMBRYOLOGICAL STUDIES ON THE ENAMEL CUTICLE.

By Dr. A. Beretta, Bologna.

This painstaking study of the enamel cuticle clearly reveals the following facts: That its histological structure is uncertain, that in regard to its origin, opinions differ widely—no less than twelve different theories are cited and also that it possesses a remarkable power of resistance to chemical agents. The author's previous researches, as published in vol. vi, 1908 of *La Stomatologia*, and confirmed by other investigators, show that the enamel cuticle is insoluble in water, alcohol, and ether, also in acids and alkalies of any strength; it resists digestion with trypsin and pepsin. From these properties the substance of the enamel cuticle is to be regarded chemically as belonging to the keratins. Qualitative analysis showed the enamel cuticle to contain all the elements generally found in keratin, besides a very appreciable quantity of phosphorus. No sulfur reaction could be discovered, though tried repeatedly. Since phosphorus cannot be regarded as the chief constituent of cuticle, the author believes the phosphorus to be derived from the cementing substance uniting the enamel cuticle and the enamel, or from the enamel itself. The total absence of sulfur or the presence of only a minute quantity thereof would distinguish the enamel cuticle from the keratins, which always contain more or less sulfur. The enamel cuticle thus belongs to a group between the keratins and the albumins. The resistance of the enamel cuticle to chemical agents should not be confused with its durability as a dental tissue. In reality, it is easily detached from the tooth by the action of mineral and organic acids, even in weak solutions, though it is not dissolved by these agents.

[*Le Laboratoire et le Progrès Dentaire*, Paris, March 3, 1912.]

TAKING THE BITE FOR BRIDGE WORK.

By H. Léger-Dorez.

For bridge work the taking of an accurate bite is essential; this the author obtains by cutting a strip of thin but stiff paper to the form of half a horseshoe, about 1½ cm. in width, and sufficiently long to cover the crown surfaces from the last molar to the central incisor. Impression compound is then heated, and shaped into a ribbon of about 2 mm. thickness, which, when hot, is laid upon the paper strip. The other side of this strip is covered in the same way, forming a sort of sandwich. After carefully heating and softening both sides, this perfectly flat ribbon is laid on the masticating surfaces of the teeth of which the articulation is to be ascertained, the patient is requested to bite, and keep his teeth closed. A few syringefuls of cold water are directed against the anterior border of the impression material, the water to be drawn out by the saliva ejector inserted on the other side of the mouth. When hardened, the compound impression is removed and transferred to the working model. The paper core gives the impression great rigidity, and, if thin ribbons of the compound have been used, a perfect articulation is obtained.

PERISCOPE.

Choice of a Bridge or a Plate.—When deciding whether to insert a bridge or a plate in a patient's mouth, it is always advisable to have some idea of the habits of the patient. If he comes to you with a mouth showing signs of neglect you may be sure that he will not bestow greater care in cleaning any appliance you may insert, whether it be a bridge or a denture. If the bridge be comfortable, the mouth will probably be kept cleaner by the ordinary process of mastication than would be the case if a plate were worn.—E. HOUGHTON, *Dental Record.*

A Practical Method of Using Smooth Broaches in Root-canal Treatment.—By using a small high-speed motor run by dry-cell battery, the rapidly revolved broach can be wrapped with the desired amount of cotton accurately and uniformly, enabling the operator to go to the apex, even in extremely small canals, without danger of forcing the broach through and beyond the cotton so carried.

The thoroughness with which this work can be done, even in cases which would be extremely difficult or even impossible by the old method of hand wrapping, will appeal to those careful operators who seek the best possible results in this class of cases.—F. R. VAN METER, *Dental Summary.*

The Care of Women's Teeth During Pregnancy.—The time has passed when it is considered necessary that women should suffer from toothache during pregnancy. It has long been taught that relations between the teeth and the impregnated uterus are so intimate that each must suffer from the faults of the other. It is an old saying: "For every child a tooth."

Almost every expectant mother thinks that an extraction is very apt to cause a premature delivery. Consequently they suffer on through pregnancy, allowing their teeth to be neglected until, by the time they find it convenient to visit their dentist, some of their teeth are so far gone that extraction of one or more becomes necessary.

It is the duty of every dentist to relieve pain and not to cause it. Every woman who finds herself pregnant should visit her dentist, tell him her condition and place herself in his hands to do whatever work he finds necessary to be done. We should take special care to avoid giving her pain at such a time, not because it would be hazardous, but because of the necessity of not shocking her nerves any more than possible. Any cavities that are liable to cause pain before the woman's delivery should be filled. Other teeth that are too bad to save should be extracted. If an anesthetic is necessary, her attending physician should be called to administer it.

If, from the skilful and careful performance of any necessary operations on the teeth, any harm has ever been done the prospective mother or her unborn child, there has never been a record made of it.—J. C. WINTERS, *Dental Review.*

Cementation of Clamp Bands in Orthodontia.—Before being cemented, the clamp band is securely clamped to the tooth. As a cementing medium. Evans' orthodontia gutta-percha has been found very advantageous, as it is not necessary to have the tooth dry, and there is absolutely no danger of the gutta-percha dissolving out.

If a zinc phosphate is to be used for cementing these bands in place, a semi-hydraulic cement should be selected. In using such a cement it is not necessary to have the tooth perfectly dry; in fact, the cement will be stronger and better if there is a slight moisture on the tooth. However, cement cannot be depended on to adhere to a tooth from which all mucus has not been removed.

The cement is mixed by first pouring out the required quantity of liquid on the glass slab; a small portion of powder is added to this liquid from the bottle, by rolling it between the thumb and finger. This powder should be thoroughly mixed with a suitable spatula before any more powder is added. The longer this mixing process is continued up to one minute, the more slowly the cement will set. Then little by little more powder is dusted out of the bottle and thoroughly spatulated, until the proper consistence is attained. At this point of the procedure the tooth should be sprayed with some alkaline solution, and the patient also be instructed to rinse the mouth with an alkaline solution. This part of the work should be attended to by the assistant.

The band is now to be filled with this cement, and the occlusal orifice of the band is closed either with the finger, or better, with a piece of No. 60 tin foil. This causes the surplus cement to escape from the gingival orifice of the band, and removes considerable of the moisture, leaving just the amount of semi-hydraulic cement required.—J. L. YOUNG, *Items of Interest.*

Proportions of Calcium and Magnesium in Bones and Teeth in Health and Disease.—It is generally recognized that rhachitic bones contain less calcium than normal bones. Dr. Gassmann has investigated the composition of rhachitic bones in regard to other elements so as to determine whether any variations in them are determining factors in the condition. An account of his research appears in the *Zeitschrift für Physiologische Chemie.* He finds that normal bones contain about 1 per cent. more water than rhachitic bones, this difference being fairly proportional to that of the calcium. The quantities of phosphoric and carbonic acid are also diminished, but the proportions of the acids to the calcium are the same as in normal bones, so that there appears to be the same stable combination of calcium with these acids in rhachitic as in normal bones. Magnesium is present in greater proportions in rhachitic than in normal bone. In connection with this fact it is interesting to note that the human teeth at the present time contain more magnesium than those of the prehistoric period, and they are at the same time less resistant. Further, teeth predisposed to caries are richer in magnesium. It would appear, therefore, that this augmentation in magnesium is an important factor. The proportions of chlorin, sodium, potassium, and nitrogen do not show any modification.—*Dental Record.*

Closing the Flask in Making a Vulcanite Denture.—Unquestionably, dry heat is far better than boiling in water as a means of softening the rubber in packing a vulcanite denture. Either will soften the rubber, but while water softens the plaster, dry heat hardens it, provided the heat is not sufficient to destroy the plaster. The pressure brought to bear upon the plaster in closing the flask is a factor to be considered. If the flask is packed cold, unless the preliminary closing is carefully done the first pressure is uneven, and the risk of injury to the mold is serious. If it is carefully done and the flask boiled, the circulation of water in contact with the rubber not yet consolidated into a solid mass does not improve it. Warming the flask and the rubber to the softening point of rubber is a decided help. Using dry heat by placing the flask over a naked flame or in direct contact with the source of heat is likely to overheat the plaster in contact with the flask until it is very liable to be crushed. The ideal method is to heat the flask in a suitable oven, where it is completely surrounded with a heated atmosphere, and to heat it slowly, bearing in mind that plaster is a good heat non-conductor. The Seabury double chamber vulcanizer provided for this; the dry vulcanizing chamber is ideal for packing, and the vulcanizing being done in dry steam produces a better result. The plaster retains its full strength and resistance to pressure. Unfortunately, the additional expense barred their general use, and they are not now on the market. An old vulcanizer, useless for vulcanizing, provided with a stand inside to keep the flask from contact with the bottom, will serve admirably as an oven for packing. —W. H. TRUEMAN, *Dental Brief.*

Swaging a Cap for a Root.—It is important when making a porcelain-face crown that the little plate or cope covering the root should fit accurately. To accomplish this, fit the dowel to the root, make the plate of a high-karat soft gold, punch a hole for the dowel, pass the dowel through, place the dowel and plate in position on the root and fit the plate as well as may be, then secure the dowel and plate together while in position and invest in solder. Then place a little thoroughly softened gutta-percha or modeling compound on the under side of the plate and press it into position on the root, chill it, and remove. This gives an accurate impression of the root surface over which the plate is to fit. Then place a drop of wax on the extreme end of the dowel, varnish it to protect it from the mercury, and proceed to thoroughly pack alloy into the impression and to cover the dowel. Let this rest over night so as to get thoroughly hard. This gives an accurate model of the root, but needs strengthening before it can be used for swaging. Before removing the dowel and plate, set it in a bed of moldine—the alloy model up—place over it a suitable flask or ring and pour over it a sufficient thickness of fusible metal, and immediately plunge it into cold water.

This gives a model with a face of alloy smoother and more accurate than would be fusible metal, and a body of fusible metal, on to which the plate can be swaged with a plastic counter-die, soft rubber, moldine, modeling compound, etc. The wax placed on the end of the dowel allows it to go deeper into the model as the plate is swaged to fit, and it may require to be shortened when placed on the root after swaging. The procedure takes but little time and gives accurate results.—W. H. TRUEMAN, *Dental Brief.*

Quick Method of Remounting Teeth on Vulcanite or Weston Metal Plates with Melotte's Metal.—It not infrequently happens that the dentist is called upon to repair hurriedly a plate from which a tooth has been broken. To vulcanize it is of course the surest and best method, as thereby you get a chemical union. However, we sometimes have patients who must have their plates repaired without delay. The patient may have only a few minutes in which to catch a train, or may not have the time to await the slow process of vulcanizing. Some method has to be devised to meet such exigencies, and one is briefly described in the following:

Where a tooth has been broken out of a plate and lost or damaged, first select a tooth as nearly as possible a counterpart of the tooth so lost or damaged. Take the plate, and in the vacant space dovetail a space to a reasonable depth on the plate, cutting doll-heads to each side, using a round bur No. 8, provided the plate is thick enough. Undercut the palate portion or roof of the plate with a bur of such size as your judgment dictates, according to the thickness of the plate; then place the tooth in the space and secure it with wax, packing just enough to hold the tooth steadily. Next use plaster as an investment on the labial or cutting edge of the tooth, spreading the plaster over at least one tooth on either side of the tooth to be replaced. As soon as the plaster has had sufficient time to set, remove the wax with boiling water, and dry the dovetail thoroughly with chloroform, the chloroform serving in the dual capacity of drying the dovetail, thoroughly cleansing it and removing such wax as may not have been removed by the hot water.—G. R. LOVELACE, *Dental Brief.*

Self-cleansing Factors in the Oral Cavity and Dental Caries.—In the process of auto-purification of the oral cavity, the following factors come into consideration:

(1) The mechanical action of mastication which cleanses the teeth and mouth of bacteria, which are then carried on to the stomach.

(2) The saliva exerts a certain amount of influence in dissolving soluble substances, and carrying them off along with the bacteria, as well as in diluting to a certain extent the products of fermentation.

(3) Phagocytosis, under ordinary circumstances, is not very important, but in wounds it certainly comes into play.

(4) Dense vascular tissue, such as we find in the tongue, lips, and cheeks, presents the maximum intrinsic power of resistance to infection.

(5) The struggle for existence restricts the growth of bacteria in the mouth. This is most important. Dr. Miller has shown by experiment with the bacillus prodigiosus that it is soon destroyed in the mouth, but filtered saliva had no antiseptic action upon this bacillus. He rinsed his mouth with a culture containing 2,000,000,000 bacilli prodigiosi, and in four hours it had entirely disappeared. Undoubtedly many other pathogenic organisms which from time to time gain access to the mouth suffer the same fate, in that they are destroyed in the struggle with the normal flora that are already established therein.

Under diseased conditions, human saliva has very infective properties, as in tuberculosis, syphilis, etc. Some maintain that the saliva of patients excited or enraged or suffering pain acquires poisonous properties. The more thoroughly we can prevent the growth of bacteria, the more we shall be able to limit the ravages of caries. It takes time for acid-forming bacteria to attach themselves to the teeth and protect themselves with a gelatinous covering, and if we can remove these masses of bacteria and mucoid deposits from the surfaces of the teeth, we will prevent the greater part of caries. Whether an alkaline or organic acid mouth-wash should be used is still a matter of opinion. In cases of erosion, and after testing the saliva, an alkaline wash should certainly be ordered. By some it is considered that a mouth-wash containing an organic acid may be more efficacious, for the reason that the bacteria protect themselves with plaques from the alkaline saliva. It is a fact often noticed that where caries is rampant the saliva is often decidedly alkaline. — *Commonwealth Dental Review.*

HINTS, QUERIES, AND COMMENTS.

SPRINGS SUGGESTED IN "A DIFFICULT CASE FOR PROSTHETIC RESTORATION."

In the March 1912 issue of the Dental Cosmos, page 386, Mr. L. K. Knight illustrates a typical case in which lower prognathism and alveolar recession in the maxilla has produced a disproportion in the relative sizes of the two jaws, thereby rendering the construction of a satisfactory denture extremely difficult, but not necessarily impossible. Several sets of dentures had already been made for this patient, none of which could be retained. Presumably atmospheric pressure has been tried in all its various phases—but have *springs* been thought of?

Many operators attach only historical interest to spiral springs, and think of them only as having been employed by our predecessors, a century or more ago, for retaining those marvels of art carved out of solid ivory which represented the best artificial teeth the world had yet seen. These operators seem to be unaware of the fact that spiral springs are still very generally used throughout the old world. Over thirty years' experience in European practice has taught me the utility of spiral springs in cases where the patient cannot tolerate a plate covering the entire hard palate, or where the conformation of the mouth frustrated all attempts at retaining a plate by atmospheric pressure. In some cases these springs are temporarily useful until the patient has become sufficiently skilful in the use of his denture to enable him to discard the springs.

For a case like the one in question, where the dimensions of the maxilla are scarcely one-half of those of the mandible, I would certainly recommend strong spiral springs. Platinized gold springs are considered the most desirable, although other alloys of gold, as well as of silver, and even German silver, are frequently employed. Much of the prejudice against springs has grown out of the inability of some operators to adjust them so that they will not abrade the cheeks nor detach the plate by friction against the teeth. The retaining pins should usually be placed slightly in front of the second bicuspids, about one-eighth of an inch from the border of the plate. A slight projection should be left on the plate in such a manner as to protect the cheeks from the disagreeable contact of the springs during the act of mastication. These projections, though they are less prominent, resemble plumpers, so much so that once a young *confrère,* upon seeing them, exclaimed: "These Frenchmen don't know how to make plumpers."

Harris, in the 1863 edition of his book, after stating that "Springs were once universally but are now rarely used," admits the great difficulty of retaining a plate by atmospheric pressure when the palatal arch is nearly flat and the muscles are low down on the alveolar border, and ends by stating that "A vacuum cavity will sometimes meet the difficulty; but all mouths will not bear the irritation of this, and there is no alternative but to use spiral springs, which in some cases should be longer than in others, the usual length being from one and a half to two inches."

A little discrimination can often be exercised in our profession with advantage to both patient and operator. We are too prone to adopt new fads without sufficient reflection, and abandon methods that have long been found reasonably satisfactory.

The fact that spiral springs still have so many advocates throughout Europe, where special attention has always been given to the construction of prosthetic appliances, is in itself a strong argument in their favor, at least in special cases, even although more approved systems have superseded them in general practice.

W. F. Kelsey, D.D.S.

Marseilles, France.

OBITUARY.

DR. CHAS. H. BARTLETT.

DIED, at his home in Parkersburg, W. Va., on May 4, 1912, of apoplexy, in his seventy-eighth year, CHAS. H. BARTLETT, D.D.S.

Dr. Bartlett was born at East Hampton, Massachusetts, on February 20, 1835. He received his education in the public schools at Hampton. After leaving the public schools he entered the dental office of his uncle, and here he learned his profession. Being always diligent and energetic, he soon became very proficient in dental work.

In 1856 he located for the practice of his profession in Dunkirk, N. Y., remaining there for one year. In 1857, having a desire to go West, he moved to Davenport, Iowa, where he practiced one year. He moved to Wheeling, W. Va., in 1858, but remained there only a short time; on leaving Wheeling, he came to Parkersburg, February 2, 1859. Here he soon enjoyed a large practice.

In recognition of his ability he was appointed in 1897 by Governor Atkinson as a member of the State Examining Board, and was elected its first president. He was a member of the National Dental Association and of the West Virginia Dental Society, which society he also served as president. For this society Dr. Bartlett prepared many papers, which were always greatly appreciated by its members. He was a charter member of the Parkersburg Dental Society.

He had a stroke of paralysis in 1893, which necessitated giving up his practice for one year. After regaining his health he resumed his practice until November 1910, when a second paralytic seizure left him unable to continue in practice.

He was an active member of the Episcopal Church, member of Mt. Olivet Lodge No. 3, A. F. and A. M.; of Calvary Commandery No. 3, K. T., of Osiris Temple, Mystic Shrine; he was also a charter member of the Parkersburg Country Club.

In the death of Dr. Bartlett, Parkersburg loses one of her best known and most beloved citizens; one who has been closely identified with her religious, business, and professional life for fifty years. In public life Dr. Bartlett was the soul of honor, very easy to approach, and of a most companionable nature. In professional life he was conscientious, painstaking, and very skilful; in home life a true husband and a kind and loving father. He is survived by one son.

Funeral services were conducted by Mt. Olivet Lodge No. 3, A. F. and A. M., with Calvary Commandery No. 3 as escort.

DR. U. S. HOUGLAND.

DIED, at San Antonio, Tex., on February 29, 1912, in his forty-ninth year, U. S. HOUGLAND, D.D.S., of Kansas City, Mo.

The much regretted death of Dr. Hougland was the result of complications following an injury received while boarding a street-car two months before his demise.

Dr. Hougland was born in 1863, at Boonville, Ind. He studied dentistry at the Dental Department of the University of Maryland, from which institution he was graduated in 1885. Soon afterward he settled in Wichita, Kans., whence in 1900 he moved to Kansas City, where he conducted a most successful practice. He became associated with the Western Dental College, and was appointed professor of crown and bridge work. He was noted as a porcelain worker of considerable skill.

In 1889, the deceased was married to Miss Marion H. Niederlander, who, together with five children, survives him.

DR. AUVILLE LEROY WHITNEY.

DIED, at his home, Denver, Colo., March 15, 1912, in his forty-seventh year, A LEROY WHITNEY, D.D.S.

Dr. Whitney was born in Brownfield, Me., on March 28, 1865. He attended Tufts College Dental School in Boston, from which he was graduated in 1890. He followed the practice of dentistry for a short time in Boston, then moved to Denver, where he has since practiced.

In 1896 he took an active part in the organization of the Colorado College of Dental Surgery, in which institution he has been an earnest worker. He held the chair of dental pathology, and was secretary of the board of directors. In addition to his college work, he was a very successful practitioner, conducting an office at 616 Commonwealth Building.

Dr. Whitney was a member of the Colorado State Dental Association, the Denver Dental Association, Junior Order of American Mechanics No. 16, the Denver Athletic Club, and several glee clubs.

Dr. Whitney married, November 15, 1904, Octavia J. Dundas, who, with his mother, Mrs. Sarah M. Whitney, and a stepdaughter, survives him.

Brief Necrology.

Dr. M. A. Menges of Santa Ana, Cal., on May 3, 1912.

Dr. Charles A. Sperber of Ouray, Colo., on April 26, 1912.

Dr. Dane Plumlee of Butler's Landing, Tenn., on March 13, 1912, of pneumonia.

Dr. Charles J. Kessler of St. Joseph, Mo., on May 16, 1912, in his seventy-eighth year.

Dr. Andrew P. VanDusen of Mason, Mich., on April 27, 1912, in his seventy-eighth year.

Dr. J. E. Masterson of Sinton, Texas, on April 26, 1912, of paralysis, in his fifty-fifth year.

Dr. Joseph S. Emery of Edgefield, Ohio, on May 18, 1912, of heart failure, in his sixty-sixth year.

Dr. Elbert J. Howard of Elgin, Ill., on May 29, 1912, of acute indigestion, in his seventy-fifth year.

Dr. Leslie B. Brown of Salt Lake City, Utah, on May 5, 1912, of stomach trouble, in his fifty-sixth year.

Dr. Joseph D. Crawford of Menominee, Mich., on May 28, 1912, of heart failure, in his sixty-fourth year.

Dr. Edgar C. Cooke of Buffalo, N. Y., on May 8, 1912, in his thirty-fifth year. Deceased was a graduate of the Dental Department of the University of Buffalo, and professor of dental anatomy in that institution for several years.

Dr. William Calvin Merrick of Kansas City, Mo., on April 24, 1912, of meningitis and septic poisoning, in his forty-sixth year.

Dr. J. A. Ross of Osceola, Iowa, on June 5, 1912. Deceased was a graduate of the College of Dentistry of the State University of Iowa.

Dr. Franklin S. Carlton of Elkhart, Ind., on April 26, 1912, of paralysis, in his seventy-second year. Deceased was a veteran of the civil war.

Dr. Sands J. Bowman of Bay Ridge, N. Y., on May 22, 1912, of heart disease, in his forty-ninth year. Deceased was a graduate of the New York College of Dentistry.

Dr. Hiram F. Henderson of Bristol, Tenn., on May 29, 1912, of paralysis. Deceased was a graduate of the Dental Department of Tennessee Medical College.

Dr. James E. Robinson of Columbus, O., on May 18, 1912, of diabetes, in his seventy-second year. Deceased was a graduate of the Ohio College of Dental Surgery.

Dr. Friend C. Leslie of Lake Mills, Iowa, on May 28, 1912, in his forty-first year. Deceased was a graduate of the College of Dentistry of the State University of Iowa.

Dr. Benjamin N. Tuttle of Philadelphia, Pa., on May 16, 1912, of apoplexy, in his forty-second year. Deceased was a graduate of the Pennsylvania College of Dental Surgery.

Dr. James F. Thompson of Fredericksburg, Va., on April 18, 1912. Deceased was a graduate of the Baltimore College of Dental Surgery, member of the Fredericksburg Dental Society, and its first president.

Dr. John C. Hennessy of Reno, Nev., on April 14, 1912, of heart failure, in his forty-sixth year. Deceased was a graduate of the Dental Department of the College of Physicians and Surgeons of San Francisco.

Dr. Emanuel M. Wolfe of Oil City, Pa., on May 4, 1912, of palsy, in his sixty-fifth year. Deceased was a graduate of the Pennsylvania Dental College, and a member of the Lake Erie Dental Association, the Pennsylvania State Dental Society, the American Dental Association, the International Medical Congress, and the Oil City Dental Society, of which he held the presidency for several terms.

DENTAL COLLEGE COMMENCEMENTS.

ROYAL COLLEGE OF DENTAL SURGEONS OF ONTARIO.

The annual commencement exercises of the Royal College of Dental Surgeons of Ontario were held in Toronto, Ont., on May 3, 1912.

An address to the graduates was delivered by G. A. Warburton, M. A., general secretary of the Y. M. C. A. of Toronto.

The degree of Licentiate of Dental Surgery was conferred by the president, W. J. Bruce, L.D.S., D.D.S., on the following graduates:

John T. Adams
Herbert S. Allen
Percy G. Atkinson
Cornell O. Bond
John M. Campbell
A. D. Childerhouse
Thomas Cowling
Frederick R. Davis
Robert S. Decker
Clement J. Devine
Bruce A. Dickson
Norman K. Douglas
Robert V. Hall
Francis Hinds
John H. Hockin
Arthur R. Hynes
Frederick H. Jones
Max Katz
Roy D. Kerr
Frederick W. Landymore
George A. Liscumb
Walter G. Manning
Harold W. Mitchell
John H. W. Moore
Warren Morley
Victor H. Macaulay
Stanley G. McCaughey
Ernest C. McDonald
Roy G. MacGregor
Morton A. McIntyre
J. McAdam McIntyre
Donald K. McIntosh
Robert J. Pennal
Thomas H. Renton
Ren S. Robertson
W. F. Roper
Frank E. Sandercock
Wm. Geo. E. Spence
Louis Ernest V. Tanner
Archibald S. Thomson
Robert D. Thornton
Marshall G. Vair
Daniel J. Weadick

MEHARRY DENTAL COLLEGE.

The annual commencement exercises of Meharry Dental College were held at Ryman Auditorium, Nashville, Tenn., April 23, 1912.

Addresses were delivered by Dr. M. C. B. Mason and by Hon. J. W. Brister, state superintendent of public instruction.

The degree of Doctor of Dental Surgery was conferred on the following graduates:

L. A. Bowman	South Carolina	O. W. Kerr	Alabama
I. Darden	North Carolina	A. T. Landers	Tennessee
R. E. Gilton	Tennessee	Theodore Long	Florida
W. L. Hayden	Missouri	H. A. Powell	Arkansas
L. H. Hampton	Florida	H. D. Voorhies	Tennessee
D. K. Johnson	Mississippi	G. W. Washington	Mississippi
F. L. Johnson	Kentucky	Charles Williams	Texas
J. E. Jones	Alabama	M. H. Williams	Mississippi

SOUTHEASTERN DENTAL UNIVERSITY.

The annual commencement exercises of the Southeastern Dental University were held in Atlanta, Ga., on May 8, 1912.

The degree of Doctor of Dental Surgery was conferred on the following graduates:

William H. Liner
Thomas A. Price
Idus Whitten

CINCINNATI COLLEGE OF DENTAL SURGERY.

The annual commencement exercises of the Cincinnati College of Dental Surgery (Dental Department of Ohio University) were held at the Business Men's Club, Cincinnati, Ohio, on May 16, 1912.

Addresses were delivered by Dr. Alston Ellis, president of Ohio University, and Dr. G. S. Junkerman, dean.

The degree of Doctor of Dental Surgery was conferred by E. W. Wilkinson, president of the board of trustees, on the following graduates:

Thomas Benham
Wm. E. Braman
Hugh E. Burnett
Albert W. Corrill
Ernest J. Glick
Edward Hackett
John W. Kehm
Charles E. Link
Frank E. Little
Earl N. McKee
Edwin Maffey
Millard F. Oder
Willis J. Sattler
Wilbur R. Turner
Anthony L. Vafiadakis
Abe L. Wahn
Chas. E. Walsh
Isaac S. Woiler

SOUTHERN DENTAL COLLEGE.

The twenty-fifth annual commencement exercises of Southern Dental College were held in Atlanta, Ga., May 14, 1912.

An address was delivered by Rev. Hugh Walker.

The degree of Doctor of Dental Surgery was conferred by Judge T. P. Westmoreland on the following graduates:

Ollie L. Adams
Clarence D. Bain
Fred P. Batton
William S. Beard
C. Luke Berry
Fred C. Bolding
Herbert C. Broadfoot
Eulie N. Brown
Van R. Burnham
E. O. Burnham
William M. Burton
Louis W. Bush
V. E. Charpie
William H. Coker
Morton H. Crew
Walter H. Critz
Ernest C. Draffin
Charles B. Draffin
Edward Fletcher
Manly H. Fouts
Fred F. Garrigo
Edward L. Gatlin
Warren A. Getch
Richard L. Gnann
Andrew D. Gnann
Harry S. Higgins
Joseph S. King
Dillan S. Kitchens
Edward F. Lafitte
Payton A. Leard
Robert E. Lee
James W. McCaffrey
Tom L. McCoy
Wayne P. McGuire
Joseph G. Morris
William L. Nance
A. K. Pritchett
A. L. Rodgers
Charles G. Segars
Charles E. Sellers
Marshal S. Smith
James H. Stacey
William Oscar Terry
Q. J. Thompson
B. B. Vandergriff
Robin Carlisle Wilson
Cæsar A. Yarbrough
Clyde B. Zirkle

ATLANTA DENTAL COLLEGE.

The annual commencement exercises of Atlanta Dental College were held in the Atlanta Theater, May 15, 1912.

The valedictory address was delivered by Paul Kennedy McGee.

The degree of Doctor of Dental Surgery was conferred by Judge W. R. Hammond on the following graduates:

Dayton S. Altman
Thomas S. Barnhill
Dexter Blanchard
Robert L. Bridger, Jr.
Ira W. Brown
Thomas E. Caudill
Orville R. Cheatham
Carter Crafford
William R. Craig
Stephen G. Cobb
Meyer Cristol
James E. Davis
Homer A. Davis
Milligan E. Day
Homer P. Dobbins
Lawton L. Donaldson
Joseph W. Edmundson
Amos K. Gregory
Forrest B. Hicks
Robert C. Hicks
Franklin B. Hines
William B. Holmes
Lamb B. Kerrison
Charles G. Kirkpatrick
Edward L. Langston
Lovick P. Langston
Lott W. Lee
Leslie J. Meredith
Numa E. Morgan
Jere W. Murphy
William R. Murrelle
Edward W. Myers
Paul K. McGee
Wesley B. McCall
Henry L. Paris
Henry B. Park
Robert R. Rigby
Louis Rossheim
Henry S. Riddell
Roma L. Shaw
Nevon R. Stone
Carl C. Smith
Thomas G. Swanson
Hugh S. Torbet
Grene L. Talbot
Joseph E. Thornton
Witherspoon Wallace
Levin I. Watkins
John T. White
Horace L. Yelton
Charles W. Young

TEXAS STATE DENTAL COLLEGE.

At the annual commencement exercises of State Dental College held in the High-school auditorium, Dallas, Texas, on May 15, 1912, the degree of Doctor of Dental Surgery was conferred on the following graduates:

Max R. Andrews
Addison L. Brasher
Arthur L. Brown
Thomas M. Clark
James W. Clements
Clifford C. Collier
Charles A. Dahnke
John D. Dial
James D. Ellington
F. Houston Lynch
O. W. H. McCall
Elmer E. McKinley
Frederick H. Miller
Ira E. Nash
Charles O. Oldham
Redmond J. Savage
Homer Simpson
Sidney A. White
Wm. B. White
Dan M. Witt

LINCOLN DENTAL COLLEGE.

The fourteenth annual commencement exercises of Lincoln Dental College were held in the auditorium of University Temple, Lincoln, Nebr., on May 16, 1912.

The doctorate address was delivered by Rev. W. W. Lawrence.

The degree of Doctor of Dental Surgery was conferred by Dr. Clyde Davis, dean, on the following graduates:

Earl C. Alldritt
Corol E. Brown
Gustav M. Griess
George A. Grubb
Alonzo W. Luff
Ralph S. Sturdevant
Roscoe D. Withers

UNIVERSITY OF TENNESSEE, COLLEGE OF DENTISTRY.

The thirty-fourth annual commencement exercises of the University of Tennessee, College of Dentistry, were held in the Goodwyn Institute, Memphis, Tenn., on May 17, 1912.

The valedictorian was Clarence M. Pate, and the doctorate address was delivered by H. C. Rushing, D.D.S.

The degree of Doctor of Dental Surgery was conferred by Dr. Brown Ayres, president of the university, on the following graduates:

Herbert P. Balthrop	Tennessee	Henry C. Maxey	Texas
James E. Davis	Tennessee	Vernon W. Montsinger	North Carolina
George I. Freeman	Tennessee	Guy B. Odil	Tennessee
Joseph E. Gordon	Virginia	Clarence M. Pate	Mississippi
Baxter W. Law	Tennessee	William T. Roberts	Tennessee

UNIVERSITY OF CALIFORNIA, DENTAL DEPARTMENT.

The forty-ninth annual commencement exercises of the Dental Department of the University of California were held in the Greek Theater, Berkeley, Cal., on May 15, 1912.

The degree of Doctor of Dental Surgery was conferred on the following graduates:

Fusajiro Aono	Japan	Chas. B. Murray	California
Alfred E. Bernstein	California	August C. Nor	California
Frank P. Burton	California	Herbert J. Samuels	California
Chas. L. Daingerfield	California	Leslie H. Squier	Colorado
Louis W. Layne	California	Jacob F. Steffan	Nevada
Abraham H. Leiser	California	Lincoln Van Orden	California
Sidney Levy	California	Frederick W. Wilson	California
Earl L. McGlashan	California		

UNIVERSITY COLLEGE OF MEDICINE, DENTAL DEPARTMENT.

The annual commencement exercises of the University College of Medicine, Department of Dentistry, were held in Richmond, Va., on May 23, 1912.

Addresses were delivered by the president, Stuart McGuire, M.D., and by Rev. Geo. W. McDaniel, D.D.

The degree of Doctor of Dental Surgery was conferred on the following graduates:

Thomas B. Allen	North Carolina
Herbert R. Boyd	Virginia
Albert del Castillo	South America
Wilbur A. Hawks	Virginia
James O. Hodgkin, Jr.	Virginia
William N. Hodgkin	Virginia
Frank P. Repass	Virginia
Charles C. Rush	Virginia
Burney B. Shamburger	North Carolina

KANSAS CITY DENTAL COLLEGE.

The thirty-first annual commencement exercises of the Kansas City Dental College were held in the First Presbyterian Church, Kansas City, Mo., on May 21, 1912.

An address was delivered by Ewing S. Hudson.

The degree of Doctor of Dental Surgery was conferred by Dr. John D. Patterson, president, on the following graduates:

Lloyd E. Alquist
Benton T. Asbury
Robert McC. Blachly
Jonathan M. Bradford
Fred J. Boller
Benjamin H. Bornhauser
Archie M. Burbank
Melvin R. Chapin
Guy H. Cleveland
Phillip Mathues Dampf
William B. Daniels
Thomas G. Duckworth
John H. Duffy
Samuel G. Fore
Elmer C. Hansen
George M. Hollenback
Dana D. Herrell
Edward LeR. Hodge
Warren E. Jeffrey
Carl S. Jones
Eugene V. Kalin
David F. Kagey
Charles W. Keeling
Charles A. Knecht
Gilmer Mark Laffoon
Anathol F. L'Ecuyer
Guy L. Lewis
William H. Lyman
Dennie O. Martin
Wallace Mace
Edgar T. McKim
Edgar A. Miehe
Raymond B. Miller
William V. Neighbors
Edward I. Poutre
Francis S. Robinson
Joseph E. Rose
Charles A. Ross
Marion R. Shaw
Oren A. Smith
Selden B. Stout
William P. Sutton
Charles W. Wells
Robert M. Wooderson

NORTH PACIFIC COLLEGE, DENTAL DEPARTMENT.

The annual commencement exercises of the North Pacific College, Dental Department, were held in the First Baptist Church, Portland, Ore., on May 22, 1912.

The annual address was delivered by Hon. Oswald West, governor of Oregon, and the charge to the graduates was given by Mr. Wm. F. Woodward.

The degree of Doctor of Dental Medicine was conferred by Dr. Herbert C. Miller, president, on the following graduates:

Martin Abelson
Elbert W. Barnum
Loran Bogan
Leo M. Boire
Joseph A. Brewitt
Delbert C. Burton
John W. Caffyn
Francis N. Christensen
James E. Crahen
Frank Dye
Fred Ellis
Duane A. Fellows
Milton H. Fisher
Wooster H. Fisk
Ernest Fowler
Jesse B. Grider
William M. Hanna
Peter F. Hawkins
Frank A. Hill
Roy R. Hill
George E. Humberstone
Earl D. Hutchison
Robert L. Jones
Takeo Komiyama
Dallas Loy
Melvin W. Markham
George W. McCauley
Lelia M. McMillan
William J. McMillan
John Olson
Robert Fred Omeg
Geo. G. Pennepacker
Ralph O. Pray
Winfred H. Price
Walter R. Riley
Leo E. Robinson
Benjamin O. Saphro
Alf Swennes
Charles Otto Terry
Clarence Ross Townsend
Theodore B. Turner
Floyd L. Utter
Benjamin Vitou
William H. Waddington
Lee A. Wandell
Orange T. Wherry
David F. Wyman
Henry D. Young

STARLING-OHIO MEDICAL COLLEGE, DENTAL DEPARTMENT.

THE fifth annual commencement exercises of the Dental Department of Starling-Ohio Medical College were held in the chapel of Ohio State University on May 22, 1912.

An address was delivered by Rev. Carl L. Patton.

The degree of Doctor of Dental Surgery was conferred by the president, Dr. W. O. Thompson, on the following graduates:

Harold E. Albaugh
Carl E. Bobo
Thomas W. Boyce
Henry J. Brunk
Terry P. Bull
William G. Capel
Clyde H. Cox
Percy C. Damsel
Ray W. Davidson
Peter A. Dehey
Harry M. Deiber
Charles G. Devoe
Emery Dibert
Kyle D. Dotson
Stacy E. Eib
William A. Geib
William H. Gernert
William V. Gertler
Joseph M. Gruber
Herbert E. Guthrie
Fred L. Heibert
Cyrus D. Higgins
Gailord M. Hiner
Edward F. Hoffman
Earl G. Jones
Sylvanus L. Jones
William H. Knoderer
Eugene Milburn
Guy V. Millard
Raymond Miller
Walter E. Miller
Roy A. Ober
Lester C. Ogg
Clifford W. Renth
George E. Ricketts
Joseph Ruzow
Charles W. Shannon
Cliff R. Shinaberry
Daniel J. Steiner
Charles W. Strosnider
Harold U. Sykes
Alger R. Vosper
Benjamin C. Warfield
William H. Wolford

BALTIMORE COLLEGE OF DENTAL SURGERY.

THE seventy-second annual commencement exercises of the Baltimore College of Dental Surgery were held in Albaugh's Theater, Baltimore, Md., on May 23, 1912.

The annual oration was delivered by Rev. Oliver Huckle, and the valedictorian was J. G. Kerwin.

The degree of Doctor of Dental Surgery was conferred by the dean, M. W. Foster, M.D., D.D.S., on the following graduates:

J. E. Aldridge	West Virginia
H. Bittner	New Jersey
A. A. Blondin	New Hampshire
F. J. Canning	Rhode Island
T. M. Canning	Rhode Island
A. Cary	Connecticut
J. O. Cassidy	New Hampshire
J. L. Christopher	Massachusetts
L. C. Couch	North Carolina
C. F. Craft	Long Island
E. F. Dalton	Massachusetts
F. A. Devanney	Rhode Island
J. M. Dominguez	Cuba
T. E. Dunn	Massachusetts
C. E. Edge	North Carolina
G. L. Ely	New York
F. M. Farnsworth	West Virginia
P. L. Farrell	Massachusetts
E. J. Fernandez	Porto Rico
T. C. Firey	Maryland
M. M. Fitzgerald	Virginia
P. B. Fitzgerald	Massachusetts
J. J. Fitzpatrick	Connecticut
S. P. Fuller	Maryland
L. L. Givens	Virginia
E. E. Graham	Massachusetts
R. T. Harrigan	Pennsylvania
W. G. Hitchcock	Georgia
H. C. Hodgson	Prince Edward Island
J. G. Jackson	Virginia
T. P. Kavanagh	Pennsylvania
G. W. Keating	New Jersey
J. G. Kerwin	New Jersey
C. W. King	Maine
A. Lankford	Virginia
A. W. Lockwood	Maryland
A. G. Lyle	Massachusetts
J. J. McGreevy	Massachusetts
W. J. Maguire	Rhode Island
F. P. Mansuy	Pennsylvania
D. Maroney	Connecticut
J. H. Martin	West Virginia
F. R. Minns	Massachusetts
J. J. Mulcunry	Connecticut
G. W. Noonan	Massachusetts
G. T. Norton	Vermont
E. M. O'Brien	Florida
J. O'Connell	Connecticut
S. F. Penton	Alabama
D. C. K. Ricketts	New Jersey
H. D. Rhein	Pennsylvania
C. J. Robbins	Virginia
H. L. Satterfield	West Virginia
J. J. Shea	Massachusetts
L. W. Sherwood	Washington
W. G. Sherman	Rhode Island
J. A. Smyth	Massachusetts
T. W. Spear	Maine
W. A. Turner	Canada
E. S. Webster	Virginia
W. K. White	Georgia
D. P. Whitworth	Maryland
C. D. Wofford	Texas
J. C. Yunker	New Jersey

BARNES DENTAL COLLEGE.

THE annual commencement exercises of Barnes Dental College were held on May 27, 1912, in the First Christian Church, St. Louis, Mo.

The degree of Doctor of Dental Surgery was conferred on the following graduates:

Compton H. Barrett	Arkansas
Gustav A. Depping	Missouri
Clinton J. Huber, Jr.	Missouri
Henry Leutkemeyer	Missouri
Clark E. Morrow	Missouri
William Osberghaus	Missouri
Otto S. Schmidt	Missouri
Hiram N. Smith	Missouri
Harry Scheele	Missouri
Adolphus H. Whittington	Illinois

UNIVERSITY OF BUFFALO, DEPARTMENT OF DENTISTRY.

THE twentieth annual commencement exercises of the University of Buffalo, Dental Department, were held in the Teck Theater, Buffalo, N. Y., May 31, 1912.

An address was delivered by Hon. George B. Burd, LL.B.

The degree of Doctor of Dental Surgery was conferred by the chancellor, Chas. P. Norton, A.B., on the following graduates:

John F. Barnett
Lawrence J. Barter
Silas R. Bryant
Charles T. Chapman
Ethan M. Clark
Frank H. Conklin
George Conyne
Edgar J. Doolittle
Edson J. Farmer
Eric W. France
Clyde A. Gabeler
Floyd E. Gibbin
Adelbert B. Gibbs
Joseph M. Haley
Alfred A. Janowitz
Herbert E. Luther
George H. Martin
Frank S. Maxson
John E. Neilon
Raymond J. Sandman
Charles L. Schifferdecker
Benjamin Sherris
Nicholas J. Shults
John J. Smeja
Vernon Stanley
Archie B. W. Suter
George A. Swagler
Harry E. Tallman
Philip S. Wein
Raymond B. Weston

LOUISVILLE COLLEGE OF DENTISTRY.

THE annual commencement exercises of the Louisville College of Dentistry were held in Macauley's Theater, Louisville, Ky., on May 29, 1912.

The degree of Doctor of Dental Surgery was conferred on the following graduates:

Louis Becker	Kentucky
R. H. Benson	Kentucky
H. G. Collins	Kentucky
H. G. Collins	Kentucky
John S. Cornn	Kentucky
Kinsman C. Dingus	Virginia
J. Edward Faulkner	Kentucky
Carlos Ferrer	Pennsylvania
George M. Frith	Kentucky
C. J. Giesler	Kentucky
Errett Harmon	Indiana
Elam Harris	Kentucky
S. G. Harrison	Kentucky
D. O. Illyes	Illinois
J. R. King	Kentucky
Ed. P. Marcilliat	Indiana
Frederick A. Millard	Kentucky
Clarence Mingis	Indiana
W. M. Newberry	Kentucky
Luther H. Owen	Tennessee
Jess B. Perkins	Kentucky
E. J. Ritter	Indiana
F. S. Robbins	Montana
A. E. Russell	Mississippi
Curtis R. Slone	Kentucky
N. B. Smith	Kentucky
W. Homer Smythe	West Virginia
Claude Spindle	Kentucky
F. A. Stacy	Mississippi
J. F. Stewart	Florida
Doyle Stubblefield	Mississippi
Cullie B. Walter	Kentucky
Charles H. Ward	Texas
Leonard Weaver	Kentucky
J. H. Weisenburgh	Kentucky
Wm. A. Wheeler	Kentucky
Gideon Whitaker	Kentucky
Little Whitaker	Kentucky
U. S. Widman	Indiana
T. G. Wright	Kentucky

VANDERBILT UNIVERSITY, DEPARTMENT OF DENTISTRY.

The annual commencement exercises of the Dental Department of Vanderbilt University were held in Nashville, Tenn., on May 23, 1912.

An address to the graduates was delivered by Rev. G. B. Winton, D.D.

The degree of Doctor of Dental Surgery was conferred by Chancellor J. H. Kirkland, A.M., Ph.D., LL.D., on the following graduates:

Denny B. Beattie	Missouri
James P. Bell	Alabama
Perrin L. Berry	Mississippi
Little B. Brown	Mississippi
Ralph R. Byrnes	Georgia
Alfred H. Carter	Tennessee
Jere B. Cotten	Louisiana
John R. Crockett	Texas
George W. Finger	Tennessee
James F. Gaines	Texas
Gyp Hudspeth	Texas
Volnos L. Izard	Mississippi
M. C. Izlar	Florida
Charles O. Johnson	Tennessee
John D. Johnston	Alabama
Job W. Jones	Tennessee
William D. Lanier, Jr.	Alabama
Joel W. McCook	Louisiana
Henry A. McDonald	Arkansas
Thomas C. McGee	South Carolina
Fred B. McMullen	Florida
Julius H. Meeks	Mississippi
J. Earl McMurphy	Alabama
Henry C. McMurphy	Alabama
Okla A. Moore	Arkansas
David B. Morrison	Tennessee
John A. Mueller	Texas
James C. Norwood	Tennessee
Lee W. Ogle	Texas
Frank F. Perry	Alabama
Grover C. Reynolds	Tennessee

OHIO COLLEGE OF DENTAL SURGERY.

The sixty-sixth annual commencement exercises of the Ohio College of Dental Surgery were held at the Odeon, Cincinnati, Ohio, on May 23, 1912.

Addresses were delivered by Prof. J. S. Cassidy, Hon. D. DeMott Woodmansee, Hon. Herbert Jenney, and Merlon L. Bayliss, D.D.S.

The degree of Doctor of Dental Surgery was conferred by Hon. Herbert Jenney, president, on the following graduates:

William R. Anderson	South Carolina
Merlon L. Bayliss	Ohio
Arnold E. Beckert	Ohio
Nile D. Blackmer	Pennsylvania
Andrew J. Blackwood	Ohio
Fred Blumenchein	Illinois
Thomas J. Bonvillain	Ohio
Charles J. Broughton	Ohio
John W. Bushhorn	Indiana
Robert A. Caskey	Ohio
Claude E. Chapman	Iowa
Hermes A. Clark	Ohio
Richard B. Clark	Kentucky
Ira S. Crile	Ohio
Walter R. East	Ohio
Winfield F. Everwine	Pennsylvania
Cecil E. Fisher	Illinois
Amor Hall	Ohio
Harry G. Hammat	West Virginia
Richard C. Hoblitzell	West Virginia
Leroy H. Kamping	Indiana
Joseph L. Kincaid	Kentucky
Susie McGarry	Ohio
Hugh W. MacMillan	New York
Edward L. Markley	Kentucky
Albert P. Matthews	Ohio
John V. Maury	Ohio
Calvin R. Parsons	Ohio
Charles Foster Pope	Ohio
Clarence E. Rardin	West Virginia
Harry G. Roby	New York
Gale E. Russum	Ohio
Charles S. Schilling	Illinois
Elmore J. Schilling	Indiana
Murray W. Scott	Ohio
Frank A. Shattuck	Kentucky
Robert J. Studer	Ohio
Joseph A. Stuntebeck	Kentucky
Benjamin H. Talbut	New York
Blaine I. Talbut	New York
Z. Harry Trowbridge	West Virginia
Edward C. Watson	Kentucky
Bernard W. West	West Virginia

SOCIETY NOTES AND ANNOUNCEMENTS.

DENTAL SOCIETY MEETINGS:

July, August, and September.

JULY.

American Society of Orthodontists. Chicago, Ill. Three days: July 1st to 3d.

New Jersey State Dental Society. Cape May. Three days: July 17th to 19th.

North Carolina State Dental Society. Raleigh. Four days: July 3d to 6th.

Nova Scotia Dental Association. Halifax. Two days: July 11th and 12th.

Virginia State Dental Association. Old Point Comfort. Three days: July 9th to 11th.

Wisconsin State Dental Society. Oshkosh. Three days: July 9th to 11th.

AUGUST.

West Virginia State Dental Society. Webster Springs. Three days: August 14th to 16th.

SEPTEMBER.

National Association of Dental Faculties. Washington, D. C. Two days: September 6th and 7th.

National Dental Association. Washington, D. C. Four days: September 10th to 13th.

Examiners' Meetings.

Idaho Board of Examiners. Boise. July 1st.

Montana Board of Examiners. Helena. July 8th to 11th.

North Carolina Board of Examiners. Raleigh. July 1st.

North Dakota Board of Examiners. Fargo. July 9th to 11th.

South Dakota Board of Examiners. Sioux Falls. July 9th.

Vermont Board of Examiners. Montpelier. July 1st to 3d.

Wyoming Board of Examiners. Cheyenne. July 1st to 3d.

CHAPIN A. HARRIS MEMORIAL FUND.

The committee appointed by the Maryland State Dental Association in charge of the Chapin A. Harris Memorial Fund call your attention to the desire on the part of the dental profession to commemorate in a suitable manner their appreciation of the services rendered by this distinguished man in the effort to elevate the profession of dentistry.

While not a Marylander by birth, his lifework was accomplished in this state, which was his home, and it was in the city of Baltimore that he established the first dental school, thus making dentistry a profession.

Connecticut has recognized and honored the name of Horace H. Hayden, a co-worker with Harris, by erecting a handsome monument to his memory at Windsor.

We are now asking contributions from dental societies, colleges, and members of the profession at large, to aid in erecting a suitable monument to the memory of Chapin A. Harris, the Founder of Professional Dentistry.

Those wishing to contribute will kindly send to Dr. H. A. Wilson, treasurer, Calvert Bank Bldg., Baltimore, Md.

W. G. Foster, *Chairman,*
W. W. Dunbracco, *Sec'y,*
M. G. Sykes,
B. Holly Smith,
T. O. Heatwole,
J. W. Smith,
H. A. Wilson, *Treas.*

NATIONAL ASSOCIATION OF DENTAL FACULTIES.

The National Association of Dental Faculties will meet at the New Willard Hotel, Washington, D. C., on Friday and Saturday, September 6 and 7, 1912. The Executive Committee will meet at 9 o'clock Friday morning, the general meeting opening at 10 on the same morning.

George E. Hunt, *Sec'y.*

N. D. A. Meeting at Washington, D. C.

September 10 to 13, 1912.

THE 1912 session of the National Dental Association will be held in Washington, D. C., September 10th to 13th, and all indications are favorable for this being the most important and successful meeting that the association has ever held.

The Local Committee of Arrangements has selected the New Willard as "Headquarters. Hotel" and for the meetings of the general sessions and the sections, as well as the "all-day clinic" on the last day. The commodious ball room on the eleventh floor of this hotel provides ideal arrangements for a successful meeting, that is, all under one roof.

THE REORGANIZATION PROPOSITION

has been receiving most liberal support from the state societies which have met since the Cleveland meeting, at which a constitution, along the lines of the American Medical Association, was tentatively adopted. This question will come up at this meeting for final action, and every one interested in the perfecting of a representative National Dental Association should be present. You are requested to remember this meeting when making your vacation arrangements, as an excellent opportunity is thus presented to attend the National Dental Association meeting and to visit our National Capital.

The details of the program are not complete, but the officers and committees have spared no effort in preparing the same. Further information will appear in the August and September COSMOS.

ARTHUR R. MELENDY, *President*,
Deaderick Bldg., Knoxville, Tenn.
HOMER C. BROWN, *Rec. Sec'y*,
185 E. State st., Columbus, Ohio.

FROM THE LOCAL COMMITTEE OF ARRANGEMENTS.

Washington as a Convention City.

THE essential requisites necessary for a successful national convention are: Central location for place of meeting; hotel and publicity facilities; convenient and suitable accommodations for presenting program; and not the least important, interesting and pleasant surroundings.

The National Dental Association meets alternately in the West, East, and South. Washington is in the Southern division, and no southern city is so accessible to the different sections of our country as is the National Capital.

Washington supplies all of these requisites and offers much more. A city that can easily handle the enormous crowds of visitors that throng the streets every four years at the inaguration of the President of the United States is patently equipped to care for any influx of visitors at other times. Washington hotel men have become accustomed to quick expansion and contraction of business. The coming and departure of Congress, with the thousands dependent upon its sessions, and the large number of conventions which have been coming to the city in recent years have served to make irregularity in numbers at depots and hotels the regular thing. Two conventions of considerable proportions were recently held in a single hotel, with no confusion in session-halls, banquets, or accommodations.

As to publicity facilities, there is no greater news-distributing center in the United States. Correspondents representing not only all of the daily newspapers of the country and many of the foreign journals have their offices in Washington, but even the technical and trade publications have their contributors and regular correspondents at the Capital.

Every patriotic American should be familiar with the National Capital, which now well merits the often-heard titles of, "The City Beautiful" and the "Paris of America." Besides the many public buildings, museums, libraries and parks, etc., the Government Departments hold thousands of features of interest to visitors.

Places of Interest.

In pleasant surroundings for the visiting delegate and his wife or daughter, who often accompany him, Washington far excels any other city of the country. It is the custom for delegates to conventions here to use much of their time seeing the hundreds of interesting and beautiful places in and about the city by means of the "Touring Washington" automobiles, upon which guides point out, as the trip proceeds, the places of especial interest. Then there are many side trips. Mt. Vernon, the home of Washington, is reached both by steamer and trolley; Alexandria, Cabin John Bridge, Arlington, and Old Annapolis, the site of the United States Naval Academy, are easily accessible by trolley cars. To the last place and to Baltimore there is a new line of heavy interurban electric cars, which travel so fast that the trip to either place is made in shorter time than by the steam roads. Washington itself, the City Beautiful, is a constant delight to the visitor, and the government departments hold thousands of features of interest to every American, and many features of special interest to delegates to conventions.

It will well repay the members of the National Dental Association to linger a few days after the meeting, or to come a few days before and spend the time visiting Washington.

Information concerning railroad rates will appear later.

JOHN H. LONDON, *Chairman*
Local Committee of Arrangements,
926 Farragut Square, Washington, D. C.

Hotels.

The headquarters of the National Dental Association and also of the National Association of Dental Faculties is the New Willard Hotel. Meetings and clinics will be held in the large ball-room on the eleventh floor. Write the hotel and make your reservations early.

Below is given a list of the principal hotels, with their rates:

S = Single, without bath. *Sb* = Single, with bath.
D = Double, " " *Db* = Double, " "

New Willard (Pennsylvania ave., 14th and F sts., N. W.): *S* $2.50 per day and up, *Sb* $3.50 per day and up; *D* $4.00 per day and up; *Db* $5.00 per day and up.

The Raleigh (Pennsylvania ave. and 12th st., N. W.): *S* $2.00 per day and up, *Sb* $3.00 per day and up; *D* $3.00 per day and up, *Db* $4.00 per day and up.

Shoreham (15th and H sts., N. W.): *S* $2.00 per day and up, *Sb* $3.00 per day and up; *D* $3.00 per day and up, *Db* $5.00 per day and up.

Ebbitt House (14th and F sts., N. W.): *S* $1.50 per day and up, *Sb* $2.50 per day and up; *D* $2.00 per day and up, *Db* $3.50 per day and up.

Hotel Gordon (16th and I sts., N. W.; American and European): American plan, $3.00 to $4.50 per day; European plan, $1.50 to $2.50 per day.

Normandie Hotel (15th and I sts., N. W.; European): *S* $1.50 and $2.00, *Sb* $2.50 to $3.50; *D* $3.00 to $4.00, *Db* $4.00 to $6.00.

New Fredonia Hotel (H st. between 13th and 14th sts., N. W.; American and European): American plan, $3.00 per day and up; European plan, $1.50 per day and up.

Cochran Hotel (14th and H sts., N. W.; American and European): American plan, $3.00 per day and up; European plan, $1.50 per day and up.

Hamilton Hotel (14th and K sts., N. W.; American): $2.50 per day and up.

Dewey Hotel (American and European): American plan, $2.50 per day and up; European plan, $1.50 per day and up.

National Hotel (6th st. and Pennsylvania ave., N. W.; American and European): American plan, $2.50 per day and up; European plan, $1.50 per day and up.

St. James Hotel (European plan): $1.00 per day and up.

Grand Hotel (15th st. and Pennsylvania ave., N. W.; American and European): American plan, $2.00 per day and up; European plan, $1.00 per day and up.

Notice from Clinic Committee.

The Clinic Committee desires to extend to all members in good standing of all dental societies a cordial invitation to attend and to clinic at the "all-day" clinic of this association, to be held at the New Willard Hotel, Washington, D. C., Friday, September 13th. The enormous ballroom, top floor of this hotel, has been secured, and the management promises us every convenience.

We call your attention to the classification of the clinical material. Every effort will be made to arrange the different events according to title and in sequence, so that the various steps in the operation may be seen at a glance, without the usual regard to chair or table. This will avoid confusion and save time, allowing the members to select and study favorite subjects without hunting all over the room.

From the material now in hand the committee can promise a large and varied clinic. In order that we may assemble all clinicians' names and titles for the preliminary program, kindly reply at once to the chairman.

COMMITTEE.

C. J. Grieves, *Chairman*, Park ave. and Madison st., Baltimore, Md.

A. O. Ross, *Vice-chairman*, 807 N. High st., Columbus, Ohio.

S. W. Bowles, *Secretary*, 1616 I st., Washington, D. C.

W. R. Clack, Mason City, Iowa.
A. P. Burkhart, Auburn, N. Y.
J. T. McClenahan, Washington, D. C.
W. D. Tracy, New York, N. Y.
George E. Savage, Worcester, Mass.
John H. McClure, Wheeling, W. Va.
J. E. Chace, Ocala, Fla.
E. L. Pettibone, Cleveland, Ohio.
H. J. Allen, Washington, D. C.
W. R. Wright, Jackson, Miss.
C. A. Lundy, Los Angeles, Cal.
S. H. McAfee, New Orleans, La.
C. M. Barnwell, Atlanta, Ga.
Richard L. Simpson, Richmond, Va.
W. H. Scherer, Houston, Texas.

Manufacturers' Exhibit.

The manufacturers' exhibit during the convention of the National Dental Association in Washington, September 10 to 13, 1912, inclusive, will be held in the New Ebbitt Hotel, which is just across the street from the headquarters and the clinics. Specifications, plans, rates, and full information can be had by addressing

Clyde M. Gearhart, *Ch'man Exhibit Com.*,
1616 I st., N. W., Washington, D. C.

AMERICAN SOCIETY OF ORTHODONTISTS.

The twelfth annual meeting of the American Society of Orthodontists will be held in Chicago, Ill., Monday, Tuesday, and Wednesday, July 1, 2, and 3, 1912.

Frederick C. Kemple, *Sec'y*,
576 Fifth ave., New York, N. Y.

INTERNATIONAL CONGRESS ON HYGIENE AND DEMOGRAPHY,

Washington, D. C., September 23d to 28th.

To the Members of the Dental Profession of the United States of America:

The fifteenth International Congress on Hygiene and Demography is to be held in Washington, D. C., September 23–28, 1912, under the auspices of the United States government.

This organization is the highest authority in matters of hygiene in existence today, and this is the most important meeting of the kind held in this country in its history; and the United States government is acting as host to the fifteen nations that have so far signified their intention of participating in the coming congress. Through the courtesy of the United States government the dental profession of this country has received an invitation to contribute to its success. This is the first time that the dental profession of this country has received such recognition by the home government. Place has been made for representation of the dental profession both upon the literary program and among the exhibitors.

The opportunity for which we have been seeking—that is, the opportunity to show the important relation the human mouth bears to the health, strength, and welfare of mankind —is now before us. The influence of this congress is world-wide in its scope and it will be visited by many thousands of people who are interested in hygiene and the general welfare of mankind. If American Dentistry is to maintain its reputation throughout the world, it behooves the members of the profession of this country to unite in a general effort to have the largest, finest, and most instructive dental exhibit in the history of dentistry assembled on this occasion, and at the request of the Oral Hygiene Committee N. D. A., Dr. J. W. Schereschewsky, U.S.P.H. and M.H.S., director of the exhibition, has set aside 1000 sq. ft. of floor and 500 sq. ft. of wall space in the building which is being erected for the exhibits, to be devoted to the use of the dental profession for exhibit purposes. At the meeting of the committee held in Cleveland March 23, 1912, a resolution was passed inviting the oral hygiene committees of all state and local organizations to co-operate with it in making a success of this exhibit. Space will be assigned in such a manner that each state, city, and town will receive full credit for contributions in this direction.

The committee earnestly requests that every member of the profession who is interested in mouth hygiene and in the welfare of the dental profession become actively interested in a campaign to make a success of this exhibit. The oral hygiene committees of the state dental societies should endeavor to place themselves in touch with local organizations in their states in an endeavor to secure aid in the way of material suitable for exhibits and money to defray the expenses of such an exhibit as this should be. The committee would ask that each state and local organization make appropriations to meet the expense of collecting, mounting, and displaying such material as would make a creditable exhibit.

The committee requests that the oral hygiene committees that can or will take part in this exhibit communicate at the earliest possible moment with Dr. W. G. Ebersole, chairman of the Oral Hygiene Committee N. D. A., 800 Schofield Bldg., Cleveland, Ohio; for local information, Dr. W. Smith Frankland, The Burlington, Washington, D. C., assistant secretary-treasurer of the National Mouth Hygiene Association for the District of Columbia.

The Oral Hygiene Committee N. D. A. instructed its secretary, Dr. Waldo E. Boardman of Boston, Mass., to communicate with Dr. Wm. H. Potter of Boston, Mass., with a view of obtaining some ideas derived from the dental exhibit shown at the International Hygiene Exhibition in Dresden, May to October 1911. Dr. Potter's response is given herewith with a view of giving some idea of how to build or prepare an exhibit of this kind:

BOSTON, April 13, 1912.

Dear Dr. Boardman,—In regard to the dental exhibit at the International Hygiene Exhibition in Dresden, May to October 1911, I am obliged to rely on my memory, inasmuch as I was unable to find a catalog of this portion of the department. There were in the exhibit as follows:

(1) Large numbers of anatomical specimens. Skulls; parts of skulls with teeth in place. In this respect it was similar to the exhibition in connection with the Fifth International Dental Congress, Berlin, 1909.

(2) Orthodontia cases represented by models. Regulating apparatus.

(3) Teeth representing the progress of decay from the initial softening to the large destructive cavity.

(4) Charts showing the percentage of dental decay among people of various occupations and living under various conditions.

(5) Charts showing the influence of food and water (hard or soft) upon the percentage of dental decay.

(6) Charts giving rules for the prevention of decay.

(7) School dental clinics. A description of the most important ones of Europe, with literature giving statistics and methods of work.

(8) The analysis of saliva. Charts showing the method employed.

These are a few of the features. There were many more which I wish I could remember.

Very truly yours,
WM. H. POTTER.

Let every member of the profession who is interested write offering to do his part. Do not wait for us to write to you, for we have much to do if we undertake to make a success of this work.

At the same meeting the Oral Hygiene Committee passed a resolution inviting the dental colleges of this country to contribute to the success of the dental exhibit; and the secretaries or deans of the various colleges are requested to communicate either with Dr. W. G. Ebersole or Dr. W. Smith Frankland indicating what aid they will give in connection with the coming exhibit. It will be so arranged that each college will be assigned space for its own exhibit. Come to our aid and give us your hearty support in this work.

Appealing to every member of the profession to become actively interested in this exhibit in the interest of the dental profession as a whole, we are

Respectfully yours,
W. G. EBERSOLE,
B. HOLLY SMITH,
WALDO E. BOARDMAN,
J. V. CONZETT,
S. W. FOSTER,
Oral Hygiene Committee N. D. A.

PRIZE COMPETITION

OF THE

Zentralverband der Oesterreichischen Stomatologen.

In view of the tenth anniversary of its organization, the Zentralverband offers a prize of K.500.00 ($100.00) for tne best heretofore unpublished essay on any subject of stomatology. Only those papers which are submitted by medical men and dentists to the president of the association (Vienna I, Graben 31) between March 1, 1912, and February 28, 1913, will be admitted to the competition.

An essay cannot be withdrawn after once having been handed in.

The judges reserve the right to divide the prize into two equal parts, should two essays of equal value be submitted. If none of the essays is adjudged worthy of the prize, the competition may be kept open for a further period not exceeding two years.

The author agrees to place his work at the disposal of the *Oesterreichische Zeitschrift fuer Stomatologie* for original publication.

The essays must be handed in ready for publication, and will if possible appear within the period open for the competition. Every essay published will be paid for at the usual rate of K.80.00 ($16.00) per galley. The cost of printing, including the illustrations, will be borne by the journal.

For the Zentralverband der Oesterreichischen Stomatologen:

Dr. W. HERZ-FRAENKL, *Pres.*,
Dr. RUDOLF BUM, *Sec'y.*

AMERICAN MILLER MEMORIAL.

TO THE DENTAL PROFESSION OF AMERICA:

The committee appointed at the December 1909 meeting of the Ohio State Dental Society to raise funds to establish an American Memorial to perpetuate the memory of the late Dr. W. D. Miller, have through the co-operation of the honorary committees of the several states collected funds amounting to $3812.50, with an additional $450.00, subscribed but not paid in at this writing. The amount asked for from the several states was pro-rated according to the membership of the state societies. Several states have over-subscribed the amount called for, others partially, while ten have failed to subscribe anything.

The proposed memorial will be a monument to consist of a life-sized bronze of Dr. Miller mounted upon a granite base, with appropriate tablets, the cost of which will aproximate $8000, and be a lasting credit to the profession. It is the desire of the committee to have a tablet stating that funds were received from representatives of the dental profession in every state of the Union, and to this end we are soliciting funds, whether they be personal or society contributions. Ohio, Dr. Miller's native state, has contributed $1400 to the fund, which amount, through personal subscriptions and component societies, will be increased to about $2000.

We are asking for a favorable consideration of the matter by the various state societies during the season's meetings, and hope the widespread appreciation of Dr. Miller's work for our profession will enable our committee to take steps toward the construction of this tribute to his memory at an early date.

Dr. Weston A. Price, 10406 Euclid ave., Cleveland, Ohio, has been selected treasurer of the fund, and to him all subscriptions should be made payable.

Yours very truly,

EDWARD C. MILLS, *Chairman,*
151 E. Broad st., Columbus, Ohio.
J. R. CALLAHAN,
25 Garfield Place, Cincinnati, Ohio.
S. D. RUGGLES,
Portsmouth, Ohio.

NOVA SCOTIA DENTAL ASSOCIATION.

The annual meeting of the Nova Scotia Dental Association will be held in Dalhousie University building, Halifax, Thursday and Friday, July 11 and 12, 1912. The equipment of the dental department affords every facility for clinical demonstrations. A good program is being arranged.

Mark the dates off your appointment book now.

Wm. W. Woodbury, *Sec'y.*

NORTH CAROLINA DENTAL SOCIETY.

The thirty-eighth annual meeting of the North Carolina Dental Society will be held at Raleigh, N. C., in the hall of the House of Representatives in the Capitol, July 3, 4, 5, and 6, 1912.

Instructive papers have been secured, and the Clinic Committee will unquestionably present a fine list of clinics. A cordial invitation is extended to all ethical dentists.

J. W. Stanly, *Sec'y,*
Wilmington, N. C.

NEW JERSEY STATE DENTAL SOCIETY.

The forty-second annual meeting of the New Jersey State Dental Society will be held in the beautiful "Million-dollar Hotel," Cape May, Cape May City, N. J., July 17, 18, and 19, 1912, commencing at 10 a.m. the first day.

The papers to be read are as follows:

Thomas B. Stillman, of Stevens Institute: "Ancient and Modern Alchemy."

H. L. Ambler, Cleveland, Ohio: "A Travelog Around the World of Dentistry"—more than interesting.

Dr. George H. Wilson of Cleveland: "Prosthetic Dentistry."

S. B. Harris and A. J. Quimby of New York: "Radiography."

Dr. Thomas Dedrick, of the Peary polar exploration: "Meningitis."

Dr. W. J. Roe of Philadelphia, "Tic Douloureux."

A paper will also be read by Dr. W. W. Belcher, editor *Dispensary Record,* Rochester; by Dr. Herbert L. Wheeler, president of the First District (N. Y.) Dental Society, and Dr. Geo. Evans, New York, N. Y.

A Valedictory by Charles A. Meeker—a five-minute paper on thirty-seven consecutive years of official service in the New Jersey State Dental Society.

Exhibits. More space than ever before; more varied and up to date. Some space still left. Write Dr. Moore Stevens, 1503 Pacific ave., Atlantic City, N. J., for floor plans.

Clinics. The latest in dentistry, with Dr. M. R. Brinkman, of Hackensack, N. J., in charge.

Automobile and power-boat races, hot salt-water baths in hotel, garage, golf links. Come and spend a week; write the hotel for rooms. Reached by Pennsylvania and Central Railroads.

Charles A. Meeker, *Sec'y,*
29 Fulton st., Newark, N. J.

WISCONSIN STATE DENTAL SOCIETY.

The forty-second annual meeting of the Wisconsin State Dental Society will be held at Oshkosh, Wis., July 9, 10, and 11, 1912.

O. G. Krause, *Sec'y,*
Milwaukee, Wis.

VIRGINIA STATE DENTAL ASSOCIATION.

The Virginia State Dental Association will meet at Old Point Comfort, Va., July 9, 10, and 11, 1912. All ethical practitioners are invited.

W. H. Pearson, *Corresp. Sec'y.*

WEST VIRGINIA STATE DENTAL SOCIETY.

The sixth annual meeting of the West Virginia State Dental Society will be held in the assembly-room of Webster Springs Hotel, Webster Springs, W. Va., August 14, 15, and 16, 1912; opening session at 2 o'clock on Wednesday the 14th.

The dentists of West Virginia, Virginia, Ohio, and Maryland are especially invited, and a cordial invitation is extended to all ethical members of the profession.

Frank L. Wright, *Sec'y,*
Wheeling, W. Va.

ILLINOIS STATE DENTAL SOCIETY.

The Illinois State Dental Society held its forty-eighth annual meeting at Springfield, May 14 to 17, 1912. The following officers were elected for the ensuing year: J. F. F. Waltz, Decatur, president; J. K. Conroy, Belleville, vice-president; H. L. Whipple, Quincy, secretary; T. P. Donelan, Springfield, treasurer; I. B. Johnson, Onarga, librarian.

The 1913 meeting will be held at Peoria, May 13, 14, 15, and 16, 1913.

H. L. Whipple, *Sec'y*,
Quincy, Ill.

VERMONT STATE DENTAL SOCIETY.

The thirty-sixth annual meeting of the Vermont State Dental Society was held in Burlington, Vt., at the Hotel Vermont, May 15, 16, and 17, 1912. There was a good attendance and the meeting was a very successful one. The meeting next year will be held at the same place.

The officers elected for the ensuing year are as follows: F. H. Brown, Enosburg Falls, president; Dana E. Dearing, South Royalton, first vice-president; Thomas Mound, Rutland, second vice-president; P. M. Williams, Rutland, secretary; W. H. Munsell, Wells River, treasurer. Executive Committee—W. H. McGoff, Montpelier; H. H. Smith, Lyndonville; G. E. Partridge, Burlington.

P. M. Williams, *Sec'y*.

NORTH DAKOTA BOARD OF EXAMINERS.

The next regular meeting of the North Dakota State Board of Dental Examiners will be held at Fargo, N. D., commencing Tuesday, July 9th, at 9 a.m., continuing through the 11th.

For application blanks and full particulars address

F. A. Bricker, *Sec'y*,
Fargo, N. D.

WYOMING BOARD OF EXAMINERS.

The Wyoming State Board of Examiners will meet to hold an examination for the examining of applicants at the State Capitol, Cheyenne, Wyo., July 1, 2, and 3, 1912. All applications must be complete, and in the hands of the secretary fifteen days prior to the time set by the board for examination to begin.

The written examination consists of anatomy, physiology, histology and bacteriology, chemistry and metallurgy, oral surgery, anesthetics, operative and prosthetic dentistry, materia medica and therapeutics, prophylactics, and orthodontia.

For further information and application blanks, address

Peter Appel, Jr., *Sec'y*,
P. O. Box 643, Cheyenne, Wyo.

MONTANA BOARD OF EXAMINERS.

The Montana State Board of Dental Examiners will meet in Helena, July 8, 9, 10, and 11, 1912, for the regular annual session All desiring to take the examination will please send in their applications to the secretary, thirty days prior to July 8th.

G. A. Chevigny, *Sec'y*,
106–108 Clark Blk., Butte, Mont.

VERMONT BOARD OF EXAMINERS.

The annual meeting of the Vermont State Board of Dental Examiners, for the examination of candidates for the practice of dentistry, will be held at the State-house, Montpelier, July 1, 2, and 3, 1912, commencing at 2 o'clock p.m., July 1st.

For application blanks and full particulars address

George F. Cheney, *Sec'y*,
St. Johnsbury, Vt.

SOUTH DAKOTA BOARD OF EXAMINERS.

The South Dakota State Board of Dental Examiners will hold its next meeting at Sioux Falls, S. D., July 9, 1912, at 1.30 p.m., continuing three days. All applications for examination, together with a fee of twenty-five dollars, must be in the hands of the secretary by July 1st. Applicants who have not complied with the above will not be permitted to take the examination.

For further information, blanks, etc., address

Aris L. Revell, *Sec'y*,
Lead, S. D.

IDAHO BOARD OF EXAMINERS.

The next meeting of the Idaho State Dental Board for examinations will be held in Boise, Idaho, beginning July 1, 1912, at 9 A.M., at the Capitol building.

Albert A. Jessup, *Sec'y.*

NORTH CAROLINA BOARD OF EXAMINERS.

The next regular meeting of the North Carolina State Board of Dental Examiners will be held in Raleigh, N. C., July 1, 1912.

For further necessary information address

F. L. Hunt, *Sec'y,*
Asheville, N. C.

ARMY DENTAL SURGEONS.

Memoranda of Changes.

For the week ending May 18, 1912:

First Lieut. Frank P. Stone, May 9th, reported for temporary duty at Fort Screven, Ga.

James F. Feely, C.D.S., May 13th, left for temporary duty at Fort Myer, Va., *en route* to Fort Washington, Md., for same duty.

First Lieut. C. E. Lauderdale, May 12th, returned to Fort Logan, Colo., from leave of absence.

James F. Feely, C.D.S., May 13th, reported for temporary duty at Fort Washington, Md.

First Lieut. R. E. Ingalls, May 8th, reports departure from Fort Douglas, Utah, *en route* to take station at Vancouver Barracks, Wash.

First Lieut. F. Homer Wolven, May 12th, reports for duty and station at Fort McDowell, Cal., from Vancouver Barracks, Wash.

First Lieut. John H. Hess, May 13th, reports departure from duty at Fort McDowell, Cal., *en route* to take station at Fort Douglas, Utah.

For the week ending May 25th:

First Lieut. R. E. Ingalls, May 10th, reported for duty at Vancouver Barracks, Wash.

First Lieut. John H. Hess, May 15th, reported for duty at Fort Douglas, Utah.

For the week ending June 1st:

Mortimer Sanderson, C.D.S., May 25th, reported for duty at Fort Monroe, Va.

First Lieut. Frank P Stone, May 27th, relieved from duty at Fort Barrancas, Fla., and ordered to Fort Ethan Allen, Vt., for duty at that post.

Arthur T. Knoderer, C.D.S., May 29th, left Columbus, Ohio, *en route* to station at Fort Oglethorpe, Ga.

John H. Snapp, C.D.S., May 29th, left Columbus, Ohio, *en route* to station at Camp E. S. Otis, C. Z. Panama.

For the week ending June 8th:

John W. Scovel, C.D.S., May 28th, reports for duty at Letterman General Hospital, San Francisco, Cal.

James F. Feely, C.D.S., May 29th, left from temporary duty at Fort Washington, Md., *en route* to Fort Totten, N. Y., for same duty.

First Lieut. John A. McAlister, Jr., June 1st, left Jefferson Barracks, Mo., on fifteen days' leave of absence.

James F. Feely, C.D.S., May 31st, reported for temporary duty at Fort Totten, N. Y.

Arthur T. Knoderer, C.D.S., June 1st, reported for duty at Fort Oglethorpe, Ga.

William A. Squires, C.D.S., June 1st, reports for duty at Fort D. A. Russell, Wyo.

First Lieut. Frank P. Stone, June 3d, granted thirty days' leave of absence.

Albert White, C.D.S., June 3d, reported for duty at Fort Des Moines, Iowa.

First Lieut. Frank P. Stone, June 5th, left from temporary duty at Fort Screven, Ga., *en route* to station, Fort Barrancas, Fla.

New Appointments of Acting Dental Surgeons.

Announcement has been made at the War Department that nine candidates have successfully passed the examinations held April 1st for commissions as acting dental surgeons. It is probable that the papers of two or three more will be approved by the Surgeon-general. Fifty-nine candidates reported for these examinations, which were held at West Point, Jefferson Barracks, Columbus Barracks, Fort Logan, and Fort McDowell. A large proportion failed in the physical examination. A majority of the candidates, who were graduates of dental schools, were able to pass the mental examination.

The next examinations will take place on October 7th, at the same places with the possible exception of West Point, for which Fort Slocum may be substituted.

The following is a list of the successful candidates and a short sketch of their records:

MORTIMER SANDERSON, D.D.S., West Philadelphia, Pa., passed the examination held at West Point, N. Y. Dr. Sanderson was born in New York city, December 5, 1885, and was graduated from the College of the City of New York, with the class of 1905.

ALBERT RAYMOND WHITE, D.D.S., Delaware, Ohio, passed the examination held at Columbus Barracks, Ohio. Dr. White was born in Delaware county, Ohio, May 4, 1885, and was graduated from the Ohio Medical University, with the class of 1906.

CHARLES BLANCHARD SEELY, D.D.S., Montgomery, Pa., passed the examination held at West Point, N. Y. Dr. Seely was born in Jersey Shore, Pa., March 26, 1886, and was graduated from the University of Pennsylvania, with the class of 1908.

ARTHUR THEODORE KNODERER, D.D.S., Columbus, Ohio, passed the examination held at Columbus Barracks, Ohio. Dr. Knoderer was born in Columbus, Ohio, April 2, 1888, and was graduated from the Starling-Ohio Medical College, with the class of 1909.

JOHN WILLIAM SCOVEL, D.D.S., San Diego, Cal., passed the examination held at Fort Logan, Colo. Dr. Scovel was born in Fort Madison, Iowa, October 21, 1885, and was graduated from the State University of Iowa, with the class of 1906.

ARNETT PERCY MATTHEWS, D.D.S., Pueblo, Colo., passed the examination held at Fort Logan, Colo. Dr. Matthews was born in Monett, Mo., September 2, 1886, and was graduated from the Western Dental College, with the class of 1911.

WILLIAM ARCHER SQUIRES, D.D.S., Grand Junction, Colo., passed the examination held at Fort Logan, Colo. Dr. Squires was born near Atlantic, Cass county, Iowa, January 17, 1887, and was graduated from the University of Denver, Colo., with the class of 1910.

FRANK COLEMAN CADY, D.D.S., Fredonia, Kans., passed the examination held at Jefferson Barracks, Mo. Dr. Cady was born at Fredonia, Kans., September 9, 1888, and was graduated from the University of Michigan, with the class of 1910.

JOHN HOWARD SNAPP, D.D.S., Columbus, Ohio, passed the examination held at Columbus Barracks, Ohio. Dr. Snapp was born in Washington, Ohio, February 19, 1899, and was graduated from the Starling-Ohio Medical College, with the class of 1911.—*Army and Navy Journal.*

◆

UNITED STATES PATENTS

PERTAINING OR APPLICABLE TO DENTISTRY

ISSUED DURING MAY 1912.

May 7.

No. 1,025,751, to A. O. KRETZSCHMAR. Toothbrush.

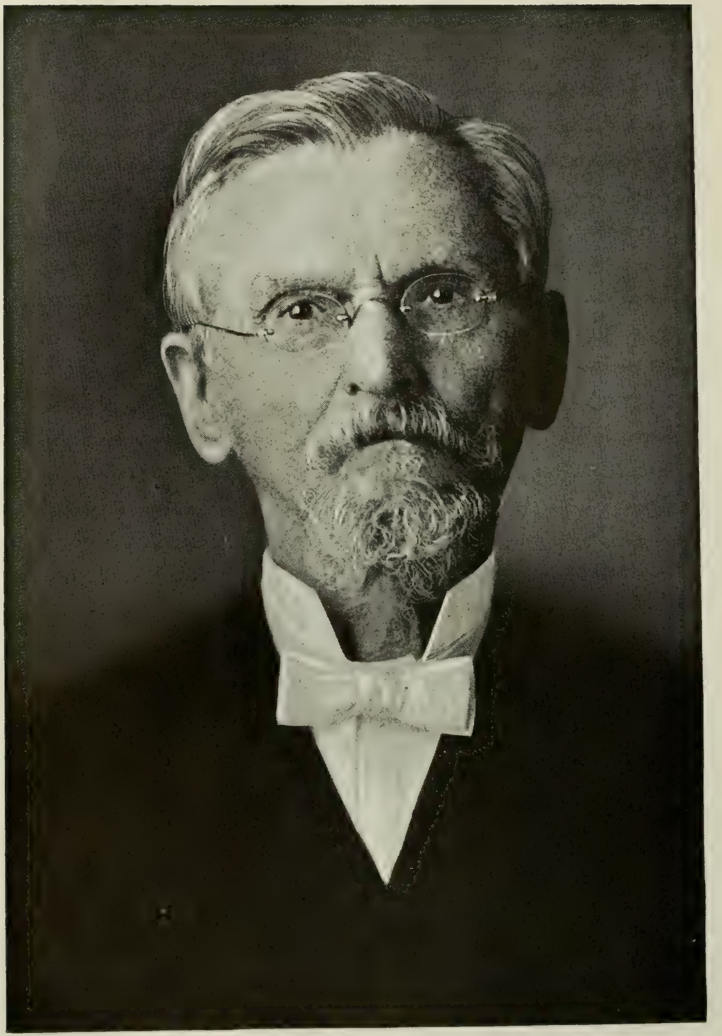
May 14.

No. 1,026,213, to JOSEPH KOHN. Artificial tooth and crown.

May 28.

No. 1,027,443, to HEINRICH SCHWEITZER. Hinge articulator.

No. 1,028,017, to LEO GREENBAUM. Denture.



DR. GEORGE J. FRIEDRICHS.

THE

DENTAL COSMOS.

VOL. LIV. AUGUST 1912. No. 8.

ORIGINAL COMMUNICATIONS.

EVOLUTION OF ORTHODONTIA—RECENT DEVELOPMENTS.

By **EDWARD H. ANGLE, M.D., D.D.S., New London, Conn.**

(Read before the Alumni Society of the Angle School of Orthodontia, Sept. 13, 1911.)

THE expansion arch, since its introduction in 1728 by the great French dentist, Fauchard, has undergone a number of modifications, some showing progress, others showing merely differences without progress, others marking steps backward, and still others representing mechanical absurdities.

THE EXPANSION ARCH FROM ITS EARLY TO THE PRESENT FORM.

The principle of the arch has not been changed, but its improvements have been toward its refinement, so that in its present form better control of the distribution of force has been gained, not only for the movement of malposed teeth, but in securing stability of anchorage. The result has been to enormously increase its efficiency and to greatly lessen its inconvenience to the patient.

The Fauchard arch is shown in Fig. 1, and some of the principal modifications of it appear in Figs. 2, 3, 4, 5, and 6.

In its early forms this arch was very crude and inefficient, and, in its attachment to the anchor teeth by means of fibrous ligatures, very unstable in comparison with its present almost ideal form of attachment by means of the easily adjusted, securely clamped anchor bands, with their tubular sheaths firmly brazed to the band at the most convenient point. By this means the firmest attachment of the arch to the teeth is secured, and the strongest attainable anchorage—stationary anchorage—gained.

The early forms of the arch, *i.e.* flat, square, or half-round, have been changed to the most compact, sanitary, and elastic form, *i.e.* the round form.

The crude methods of controlling the adjustment of the arch as to size have been supplanted by the ideal method, the screw, and to the screw has been added as a valuable improvement the friction-sleeve nut, which in the most simple manner effectually prevents the accidental unturning of the nut, besides reducing the bulk of its square, exposed portion to the minimum, and consequently lessening the inconvenience to the patient.

Another step of almost inestimable value in the use of the arch is the more perfect control of the force for moving teeth gained by the change from fibrous to metal ligatures. The fibrous ligatures involved much loss of power through slipping and stretching, necessitating their frequent removal and replacement by others, causing the springing backward and forward of the tooth in its socket, greatly disturbing the cellular structure of the pericementum, and al-

Fig. 1.

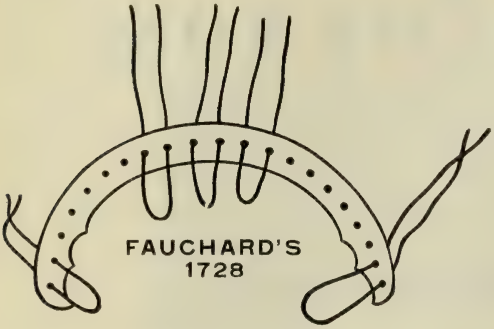


Fig. 2.

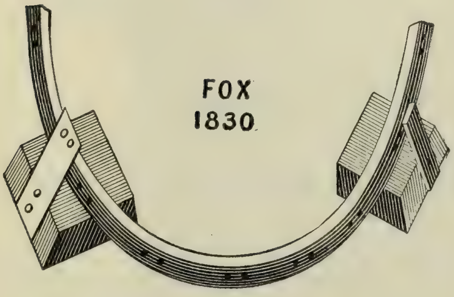


Fig. 3.

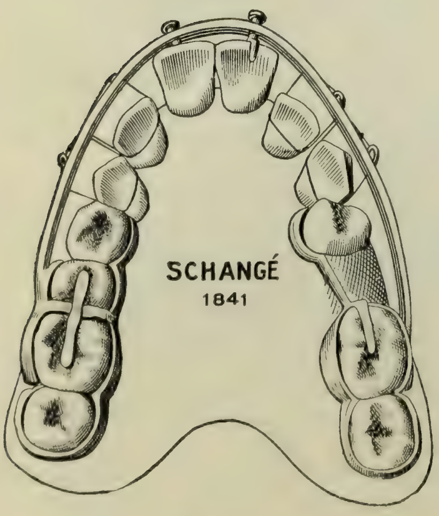


Fig. 4.

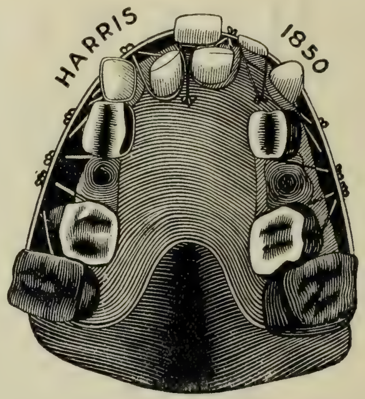
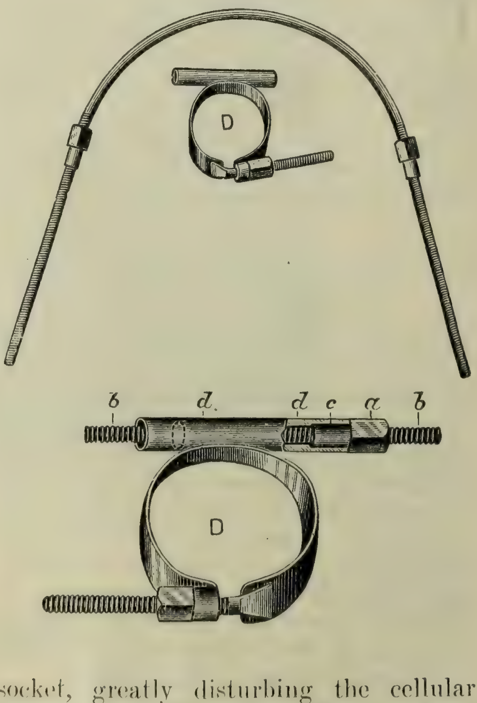


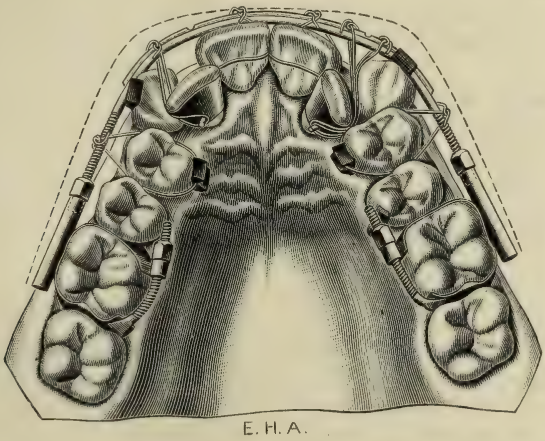
Fig. 5.



ways inciting inflammation and pain in proportion to the frequency of these disturbances, while with the use of a soft, tough wire ligature—one of brass being the best—loss of power through stretching or slipping is practically eliminated, and what is of great importance, much time is thereby saved for both patient and orthodontist. The wire ligature may also be tightened by additional twists, thus avoiding the necessity for its frequent renewal and greatly lessening tissue disturbance, inflammation, and pain.

So the expansion arch in its present form, with its auxiliaries, constitutes an orthodontic appliance so simple and efficient that it is nearly the ideal, and has very largely displaced all other forms of appliances for tooth movement. With it we have the most perfect control of the anchorage, and very perfect control of the force on the moving teeth, individually and collectively, for *tipping* their crowns into proper relationship in the line of occlusion. Little wonder, then, that it has become the chief reliance of orthodontists and a very important factor in the wonderful progress that orthodontia has made in the past few years. So efficient is it that for a number of years it seemed to the writer that its further improvement was not only unnecessary, but perhaps impossible. Continued research, however, and broader experience later convinced him that still further steps in its evolution were desirable, and probably possible. To comprehend this clearly let us remember that by the manner in which the expansion arch is now used, Fig. 6, the crowns of the teeth only are moved, or tipped, into position, with little or no favorable movement of the apices of their roots, which often leaves the teeth, after their crowns have been brought into proper relations, at a very pronounced and abnormal angle of inclination, and this just in proportion to the degree of the previous arrest in the development of the alveolar process and the bones involved. While we have learned that, as a result of the function of mastication, through the establishment of normal relationship of the crowns of the teeth, nature will be stimulated under favorable conditions to complete the development of the bone and to shift the roots of the teeth bodily to their normal upright positions, yet this often involves much time, requiring long and tedious periods of retention. Indeed, experience has proved that the degree of our success in the treatment of cases of malocclusion depends largely on the degree to which nature can be induced to complete the development of the under-developed bone, and that the measure of this bone development depends greatly upon the age and vigor of the patient. It was soon

Fig. 6.



observed that this activity in bone development was greatest in youth, or during the period of the eruption of the teeth, and that it diminished perceptibly toward maturity and after.

"BONE-GROWING" AND THE "WORKING RETAINER."

It then occurred to the writer that the retaining device should, if possible, be so constructed as to operate not only for the support of the crowns of the teeth in their corrected positions, but also to exert gentle pressure outward on their roots, and thus assist nature by stimulating the osseous cellular activity to more rapid, complete, and normal development of the bone.

The working retainer, which was carefully described and illustrated at page 265 of the March 1910 issue of the DENTAL COSMOS, and which we would request the reader to review carefully, was the result, and so successful was this method of retention that it has become an accepted practice and is recognized as a factor of much value, as with it far quicker and better results are gained in many cases than were possible before—especially, as we have said in the article above referred to, in those cases where the most active period in the development of bone had passed.

From this step the writer reasoned that our very plan of *treatment* might be greatly improved; instead of tipping the crowns of the teeth into the line of occlusion and leaving the roots at abnormal angles of inclination, to be adjusted by nature during the period of retention, the teeth should be moved bodily, *as a result of force so gentle and so evenly distributed as to stimulate normal cellular activity and the growth of bone.* In other words, the work of the orthodontist should be the intelligent assisting of nature in her process of developing bone, thus making it possible for her to normally build the denture in its entirety. When the proper assistance has been rendered and the normal growth and development of the bone and other tissues accomplished, all other conditions being favorable, the work of the orthodontist should be at an end, thus eliminating entirely the usual tedious period of retention, with its attendant difficulties and annoyances.

That tooth movement is performed more easily, more satisfactorily, and with better results when very gentle pressure, rather than pronounced force is employed, has for a number of years been becoming more and more apparent to the writer, and the correctness of this belief has now been abundantly proved by the recent remarkable research work of Dr. Albin Oppenheim of Vienna, in his elaborate experiments in moving the teeth of monkeys. These experiments were fully reported in a course of lectures by Dr. Oppenheim at the session, just closed, of the Angle School of Orthodontia; a report of these investigations will soon be published in this country, and should awaken the greatest interest, especially among histologists and orthodontists.*

AN IMPROVED FORM OF EXPANSION ARCH.

Experiments made by the writer, covering a period of four years, have resulted in the production of appliances for accomplishing tooth movement in accordance with the plan above suggested. These appliances consist of an expansion arch of further modified form, with auxiliaries and attachments. Fig. 7 shows the modified arch. It will be seen that it is divided into three parts, a middle section and two end sections. The end sections are threaded and provided with friction-sleeve nuts. The middle section is smooth, with squared ends, which accurately telescope for a distance of about one-eighth of an inch in square sockets in the anterior ends of the threaded sections. One of the advantages of this form of arch is that the middle section may be of any length or diameter desired, and as a result of many measurements of models, three lengths and three diameters of each length are found to amply provide a most convenient range of size and strength for all dentures, from the smallest to the largest, thus fully meeting all requirements in practice. All middle sections, of whatever length or diameter, are accurately interchangeable with the threaded sections, which are of the same diameter as the threaded portions of the writer's standard expansion arches E, the friction-sleeve nuts being adapted to the writer's standard D bands, Fig. 5.

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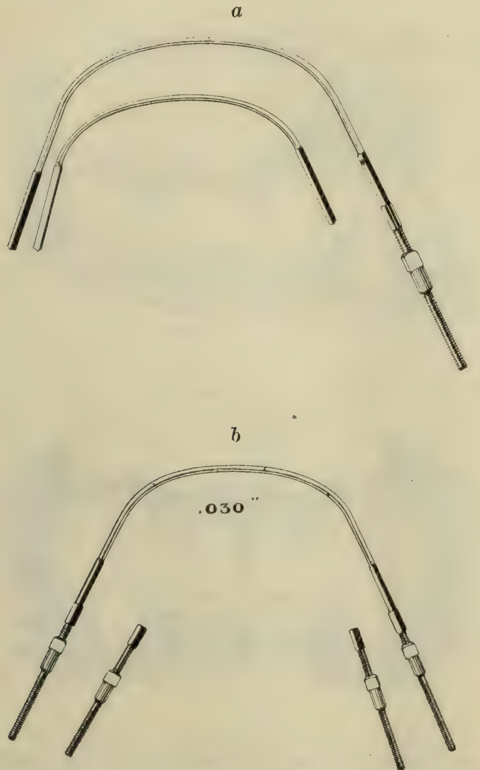
* See *American Orthodontist*, October 1911.

Fig. 7.



The three diameters of the middle sections are forty-five thousandths of an inch, thirty-eight thousandths of an inch, and thirty thousandths of an inch (.045″, .038″ and .030″). (See Figs. 8, 9, and 10.) The arches of heavier diameters, that is, .045″ and .038″, are intended to be used in connection with wire ligatures in precisely the same way as the standard expansion arch E, which has so long been familiar to all. These heavier middle sections are made in both precious metal and nickel-silver, as are also the threaded sections.

Fig. 8.

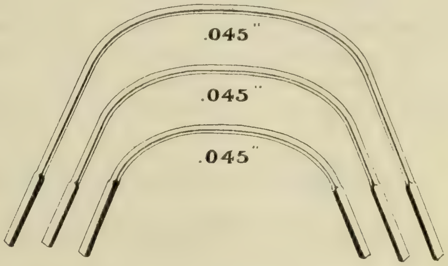


Fig. 9.

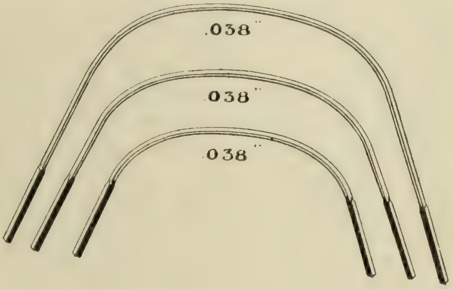
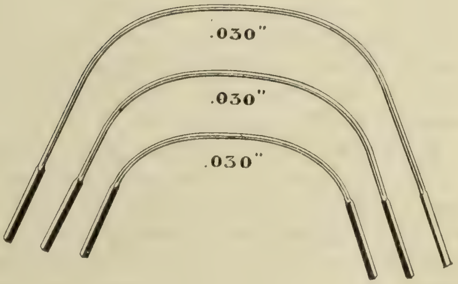


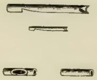
Fig. 10.



THE .030″ DIAMETER ARCH AND ITS APPLICATION.

To those already familiar with the expansion arch E, any further description of the larger diameters of the middle sections of the new arch in regard to their use in connection with the clamp bands, wire ligatures, etc., seems unnecessary; the use of the two forms of appliance and the manner of their operation is identical, but the greater convenience of the new form readily suggests itself. The manner of using the delicate arches of .030″ diameter, however, is unique, and the plan of operation radically different from that for the arches of heavier sizes just described, and it is by the use of this delicate arch only that the movement of the teeth bodily, *i.e.* of the roots as well as the crowns through the stimulation of bone-growth, is possible. It is made of precious metal only, for reasons which will be given later. In its use, wire and all other forms of ligatures are dispensed with, the attachment of the arch to the teeth to be moved being accomplished by means of delicate pins (Fig. 11) soldered directly to the arch, which engage very delicate tubes (Figs. 12 and 15) soldered to bands upon the teeth to be moved, as shown in Fig. 13, insuring the most firm and compact attachment with practically no loss of power by stretching or displacement, and with perfect control over the direction and distribution of force, not only upon the crowns of the teeth to be moved, but simultaneously upon their roots as well.

Figs. 11 and 12.



These very delicate pins, tubes, and arches are carefully proportioned and most accurately made on special machinery. The pins closely telescope the delicate tubes, which are of uniform length, diameter, and bore. One end of the pin is made in the form of a hook, which accurately fits the bevel of the end of the tube when the pin is in place in the tube. It is of the greatest importance that this hook shall not be dulled and thus rendered ineffective. The orthodontist should study its proper locking and unlocking, to avoid injuring it. The other end of the pin has the form of a minute fishtail, with a knife-edge crescent for convenience in attaching the pin to the arch with solder. A portion of the outer wall of some of the tubes is seen in Fig. 12, to be cut away in crescent form. This is not necessary, but will often serve as a convenience by giving access to the pin for its bending without wholly removing it from the tube.

Mode of applying arch in a typical case belonging to class I. In the following we shall describe the adjustment and operation of the new appliance for the treatment of a well-defined, typical case belonging to class I (writer's classification), a model of the upper jaw of which is shown in Figs. 13 and 14.

Fig. 13.

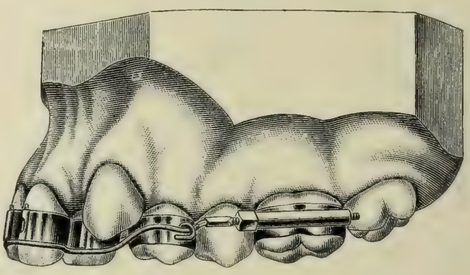
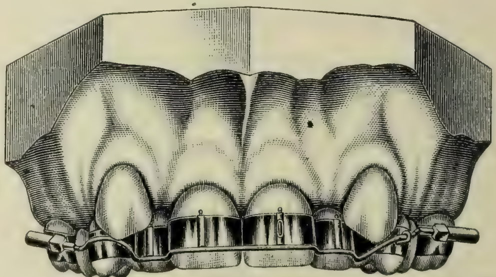


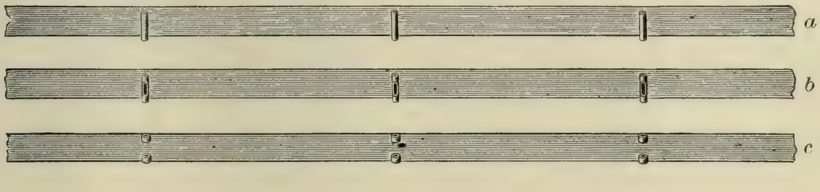
Fig. 14.



The anchor bands are carefully adjusted to the first molars, with the tubes properly aligned. The screw sections of the arch are then inserted in the tubes, and the extension flange of the nut is adjusted within the friction sleeve of the sheath of the anchor band. Accurately fitting plain bands of either precious metal or German silver are placed upon all the incisors, the seams to be made on the lingual surfaces so that the labial surfaces will present even, uniform margins. The bands on the centrals should, whenever possible, be of the same height, while those on the laterals should be uniform in height and alignment, but should occupy a plane nearer to the gingiva than the bands on the centrals, so that the distance between the margins of the bands and the cutting edges of the teeth will be the same on the laterals as on the centrals. A delicate tube is then soldered at a carefully designated point on the labial surface of each of these bands, parallel with the long axes of the teeth. The incisal ends of the tubes should not be even with the incisal margins of the bands, but slightly above them, nearly as much above as the diameter of the middle section of the arch, or .030″, the object being to provide space on the band below the tube against which the arch may rest. The result is more artistic than if the arch rested in contact with the enamel; besides, the appliance is more cleanly and compact. The gingival ends of the tubes, of course, project correspondingly above the margins of the bands.

A middle section of the .030″ diameter arch is now selected from the three lengths shown in Fig. 10. In order to determine the proper length of this section, a piece of heavy brass ligature wire is used, one end of it being placed in the square hole of the end of one of the screw sections, the wire then being bent to conform accurately to the buccal and labial surfaces of the teeth, and the bends being made sufficiently sharp so that the wire will lie closely against the labial (or buccal) surface of each tooth. The wire is then cut off, leaving a sufficient length to engage the square hole of the other screw section. The wire is then straightened and curved to correspond in shape to an unused middle section of the arch. It thus becomes a reliable gage for length for the middle section.

FIG. 15.



It will be noted that the squared ends of the middle sections of the arch are considerably longer than the depth of the square sockets in the screw sections. This affords a convenience in fitting the middle sections, for after the required length is determined by means of the brass wire gage, none of the three standard lengths may be found to be exactly of the length required, but the one most nearly approaching it may be shortened by cutting off as much as is necessary of the squared ends.

FIG. 16.

One square end of the middle section is now placed in the square socket of one screw section, and the arch carefully bent (as was the wire gage before it) with a pair of delicate round-nosed pliers of special form until it rests at the desired point on the end of the first tube. It is then notched with the most delicate knife-edge file at a point exactly corresponding to the center of the bore of the tube. The middle section of the arch is now removed, and one of the delicate pins soldered to it at the point indicated by the notch previously made.

The pin must be soldered on a line parallel with the bore of the tube. To accomplish this the head of the pin is held with the pin-holder (Fig. 16) and the fishtail end of the pin is brought in contact with the notch in the arch, and a very minute piece of 14-karat or 18-karat gold solder, with flux, is used to effect the union. A very delicate flame only must be used, else either the pin or the arch will be injured.

Another excellent method for soldering the pin at the desired point, suggested by Dr. Ketcham, is to fuse slightly a very minute piece of solder to the middle section of the arch over the notch. The middle section is then again placed in position, and another notch made in the fused solder at the same point as the first notch, after which the middle section is removed, and the end of the pin engaged with the arch at the notch, and the solder re-fused.

Whichever plan is employed, the greatest care must be observed to solder the pin at exactly the point indicated, and with the proper alignment.

The nut on the screw section is now turned forward, and this section passed into the tube of the anchor band until there is no connection between it and the middle section. The pin is then placed in the tube, and the bending of the arch continued until the next tube is reached, when the middle section of the arch is again marked and notched, exactly in the center of the bore of the second tube, and the second pin is attached, as before.

The two pins are then inserted in the tubes and the careful bending of the middle section and the attachment of the pins continued until all the pins are in place and the middle section of the arch rests *passively* in position upon the teeth, with the pins in the tubes and the hook end of each pin engaging the beveled gingival end of its tube.

Both screw sections are now slipped forward and engaged with the squared ends of the middle section to the full depth of the sockets. The nuts on the screw sections are tightened to the full depth of the extension flange with the friction sleeve, but no force is exerted upon the teeth in any part of the device. The patient is then dismissed.

The appliance is allowed to remain in the mouth for a week or so, until it has perfectly adapted itself to the teeth, and all possible soreness has subsided. At the next visit of the patient, the nuts on the screw sections are turned forward until the screw and middle sections are disjointed; the hook ends of the pins are dislodged, the middle section removed, and the appliance and teeth cleansed. The arch is then *very slightly* straightened at each bend, the pins are given a slight spring forward if it is desired to exert pressure labially on the apices of the roots of the teeth, the middle section is again gently sprung into position upon the teeth, and the hook ends of the pins relocked. The screw sections and nuts are readjusted so that there is gentle force, and the patient dismissed for at least two or three weeks. In like manner, at each visit of the patient, the middle section is removed and very slightly straightened still further, until finally it has the ideal arch form, and the crowns and roots of the teeth have been carried to their normal positions.

It will be seen that by this method a most gentle force is made to constantly operate not only on the crowns of the teeth, but throughout the entire length of their roots.

Where the teeth are crowded and overlapped, as in the case under consideration, it must be remembered that the bends in the middle section should correspond to the overlapping of the teeth, or to the diminution in the size of the dental arch. Hence it is very important that the crimps in the middle section of the arch be sufficient so that as the arch is straightened the teeth will not bind or crowd and thus interfere with their movement. This is also necessary to avoid the annoyance of removal and reattachment of the pins, which should rarely, if ever, be necessary, if judgment and skill are used in the original bending. However, in effecting double rotation of the central incisors (Figs. 17 and 18), should spaces begin to appear between these teeth, it will be necessary to gradually shorten the middle section. This is accomplished by slightly crimping the middle section opposite each of these spaces at each visit of the patient, thereby maintaining the proper length of the middle section.

FIG. 17.

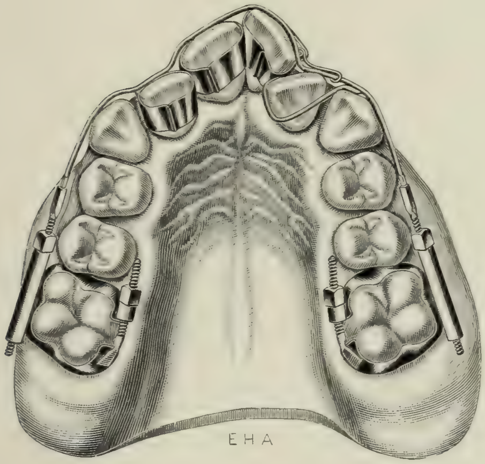
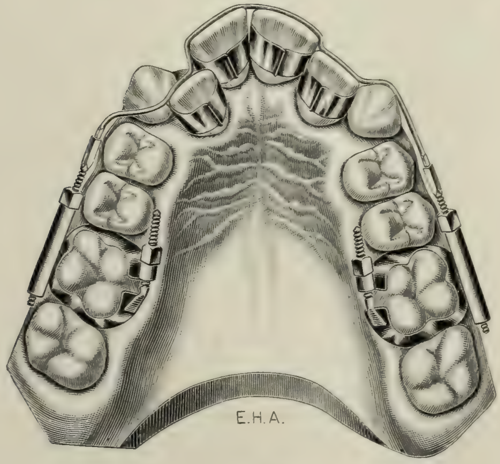


FIG. 18.



In the older form of the expansion arch (Fig. 6), the proper size for the accommodation of the enlarging dental arch was gained wholly by means of the nuts; with the new method, both the nuts and the straightening of the middle section provide for the necessary enlargement of the dental arch. The extent to which one or the other of these two means of enlargement is used depends on the requirements of the case treated. In some cases the enlargement is made almost exclusively through the nuts and screw sections, in others chiefly by straightening the bends in the middle section. Both means afford the most perfect control of the size of the appliance. The screw sectional adjustment, like the finer screw adjustment of a microscope, will always be most valuable.

FIG. 19.

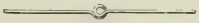
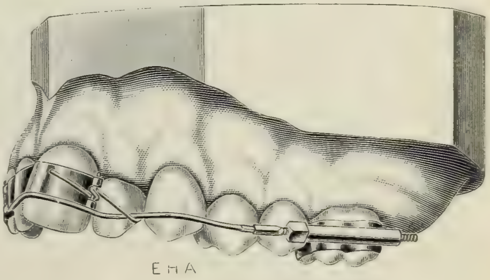


FIG. 20.



The lock hook. It will be seen in Figs. 13 and 14 that a delicate hook is attached to the bands on the premolars, engaging the arch. The end of this hook is bent sidewise sharply at right angles, and sprung slightly over the arch. This additional attachment to the ordinary form of hook forms a simple but effective lock to prevent the accidental unhooking and displacement of the arch. It has elasticity, and must be gently sprung to one side when it is desired to remove the arch. While very simple, efficient, and easier to employ than the tube-and-pin form of attachment, it should be used only when *tipping* of the crown is desired.

The hook is of the same material—precious metal—and same diameter as the pins. It must always be delicate in size and carefully proportioned, the hook-like projection to be never more than three-thirty-seconds of an inch in length.

Greater length means unnecessary bulk, and renders the appliance liable to injury during mastication.

Coiled spring attachment. The delicate coiled spring is a novel attachment to the arch. In connection with the pin, tube, and middle section, it will in the hands of those who study its possibilities and master its adjustment be found very useful for rotating teeth or for other tooth movements. It is shown separately in Fig. 19, and in position on the teeth in Fig. 20. Here it is used as an auxiliary to the arch in the rotation of a central incisor, the center or coil of the spring being engaged by a pin. To adjust it, the tube is soldered to the band, and the middle third of the tube cut entirely away, leaving the two end sections attached to the band. The space between the two ends of the tube should be no greater than the thickness of the coil of the spring, in which it is to rest. The spring is then slipped into place, and one of the little pins, after having been previously attached to the middle section of the arch at the proper point in the same manner as previously described, is slipped through the divided tube and the center of the coil of the spring, thus locking the spring in place. These tubes are of special form, their walls being thickened at the point of attachment to the band material. This is necessary to permit the pin to pass through the coil of the spring, the diameter of the wire of which the latter is made being greater than that of the walls of the other small tubes, Fig. 15. One end of the spring must bear against the middle section of the arch, and should be bent into the form of a hook to prevent its displacement. The other or free end of the spring must bear against the tooth to be rotated or against the band surrounding it in such a way as to give tension in the desired direction. In the particular case illustrated in Figs. 17 and 20, the free end of the spring bears upon the mesio-labial angle of the tooth.

The force from the coiled spring is not great, but ample to stimulate cellular activity, and its range is sufficient to maintain constant pressure for many weeks, if it be skilfully adjusted. It should occasionally be removed, and the tension renewed by its proper bending.

Patience is necessary in order to develop skill in the use of this spring, but, if mastered, it will be found a valuable adjunct to the new appliances for rotating such teeth as are difficult of movement, and which always consume so much of the orthodontist's time, as for example the lower canines.

Finger projections. By again referring to Fig. 17 it will be seen that to the middle section of the arch there is soldered a section of wire bent in the form of a hook, which engages the mesial and labial surfaces of one of the lateral incisors. This finger-like projection is occasionally bent in order to exert force for effecting the labial and mesial movements of this tooth. Similar finger-like projections will, under favorable conditions, be found valuable for performing other tooth movements. It may also be provided with pin-and-tube connections for attachment to the tooth which it is designed to move, but as simplicity is of such very great importance in orthodontic appliances, it is always better to avoid any unnecessary attachments to the arch, bending it (the arch) whenever possible, to effect its direct attachment to the tooth to be moved.

Molar clamp band and screw section—special. On rare occasions it may be necessary to move the roots of molars buccally or lingually, and this may be accomplished by the special form of non-turnable screw section with the special sheath on the anchor clamp band shown in Figs. 21 and 22. The screw section

Fig. 21.

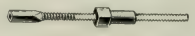
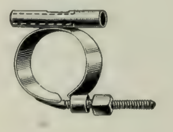


Fig. 22.



is flattened on one side, and engages a similarly flattened portion of the inner wall of the sheath of the anchor band, thus effectually preventing the screw from turning within the sheath, and permitting the application of force on the root, as well as on the crown of the anchor tooth, in the direction in which it is desired to move it.

INDICATIONS FOR, AND SCOPE OF THE NEW APPLIANCE.

It is not expected or intended that this method or these appliances will wholly displace the expansion arch as it is now so almost universally used, but it is a method of treatment which the intelligent, skilful orthodontist will find very valuable in many cases. Probably it will be found to be of greatest value in the treatment of cases belonging to class I where there is arrest in the development of the bone, although the writer sees no reason why its use may not be extended to include the treatment of cases belonging to other classes, their divisions and subdivisions; indeed, he can see many possible advantages in its use in the treatment of such cases.

Although a large number of cases have not yet been corrected by this method, yet many are being treated by former students of the writer with sufficient success to convince him that the plan is a valuable one, and he fondly hopes and believes that those who master this method will share his conviction that another real step forward in the progress of orthodontia has been made.

It is needless to say that better judgment and a much higher degree of technical skill are required for the successful use of these than for the writer's standard appliances, but those who possess the skill to successfully manipulate the latter will, by a little patience and practice, soon be able to adjust accurately and operate successfully the new appliances.

CAUTIONARY MEASURES IN MANIPULATION.

The success of this method, moreover, depends largely upon the metal of which the middle sections of the arches and the pins are composed. As the teeth are moved by means of the force derived from the spring of the arch, it is necessary that it possess a high degree of elasticity, and that this elasticity be not reduced by the heat necessary in soldering the pins directly to the arch. The metal must also be as tough as possible to permit of the middle sections of the arch being freely crimped and afterward gradually straightened without breaking, as the teeth move into their correct positions.

These exactions gave the metallurgist a difficult problem to solve, but after many months of patient research and experiment the result achieved in the combination of precious metals is believed to closely approximate the ideal for the purpose of these appliances. Still, the orthodontist must observe caution in the use of this metal. First, the bends must never be made at too sharp an angle; secondly, the metal must not be overheated; either 14-k. or 18-k. gold solder, used with only sufficient heat for its proper fusing, is the best solder for the purpose, though 22-k. gold solder may be used, if great care is exercised. Only an amount of solder sufficient to properly unite the pin with the middle section should be used. Great care must be exercised not to fuse the solder into the wire by overheating, as inelasticity and brittleness will result.

If the metal is heated to dull redness and immediately plunged in water its elasticity is reduced, but if allowed to cool slowly in the air, after heating, its full elasticity is preserved.

The Grünberg blowpipe, with its most delicate flame, is best suited for this soldering.

ADVANTAGES OF THE NEW APPLIANCE.

It may at first appear to some that this method of treatment in some cases requires a longer time to bring the teeth into the desired positions than to only tip the crowns, as is now the custom. Since, however, no case can be declared completed until the requisite amount of bone development has been gained through mechanical retention to permanently maintain the teeth in their corrected positions, it will be found that the new method actually requires less time. That is to say, from the time the appliance is first adjusted until the bone is normally developed and normal occlusion permanently established by the new method will cover a shorter period than is consumed in accomplishing the same result by the present method.

Fig. 23.

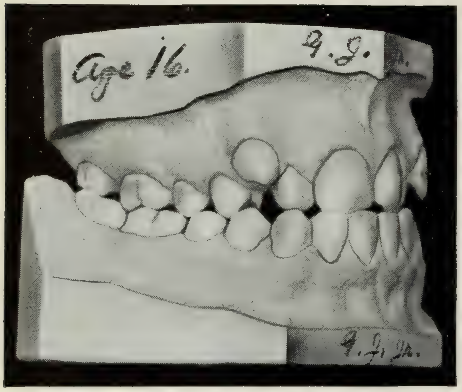


Fig. 24.

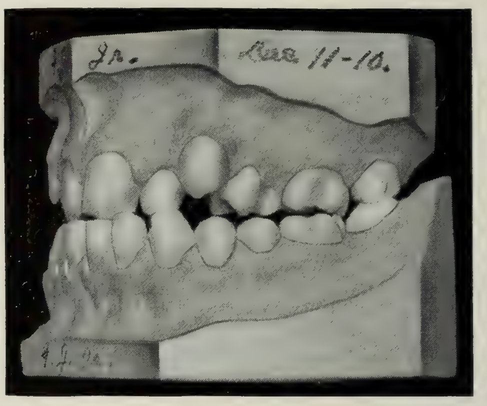
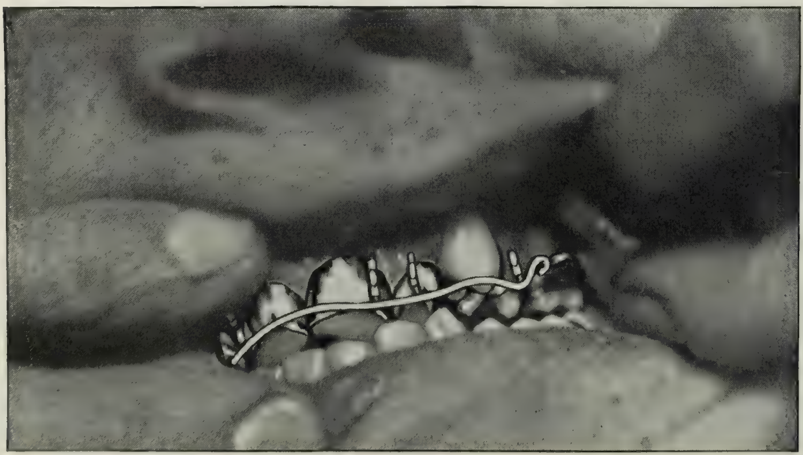


Fig. 25.



Pain in tooth movement is practically abolished by this method, and what is probably the ideal in nature's plan of tooth movement is most nearly attained. Decidedly more perfect control over the distribution of force is gained, so that the loss of time through accidental disturbance of the ligatures or other and cruder means of attachment is done away with. The danger of displacement of the appliance is practically eliminated, so that a patient may, if unavoidable, miss his appointments almost indefinitely without injury to, or undesirable movement of his teeth. The time of both patient and orthodontist is also greatly conserved, as frequent appointments are unnecessary, and patients who live at great distances from their orthodontists may be treated far more conveniently than heretofore.

The entire appliance having been reduced to the smallest bulk, conspicuousness and inconvenience to the patient from its wearing are reduced to the minimum, as is also the danger of displacing the appliance, so the patient may be instructed to be unusually thorough in the cleansing of his teeth. The parts of this appliance are so delicate, graceful, and perfectly made that if they are correctly adjusted upon the teeth, they present an appearance not unpleasing—a feature that is much appreciated by the critical and sensitive wearer; on the other hand, it is remarkable how greatly the artistic effect may be marred by carelessness with

Fig. 26.

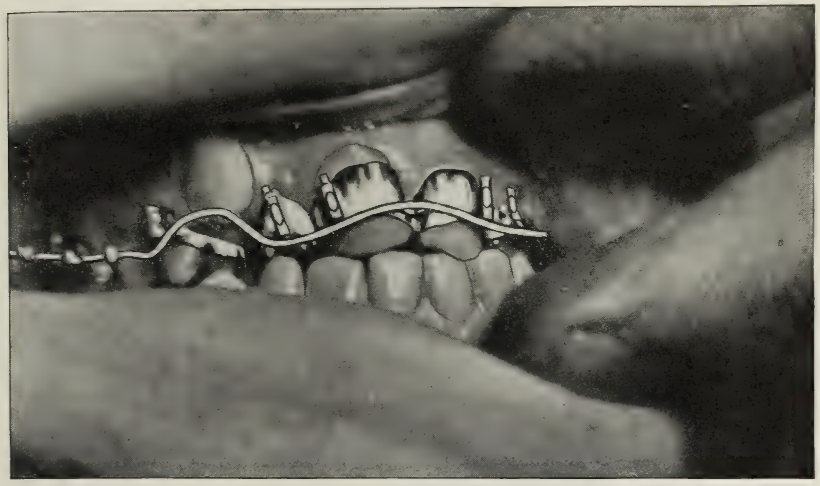
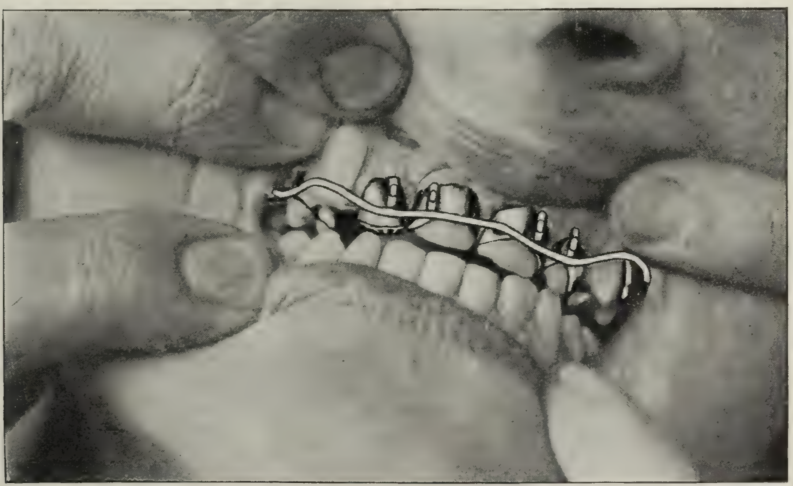


Fig. 27.



regard to size, proportion, and relationship of the parts. I think it was Millet who said, "Art is things in their places," and the adjustment of these or of any other appliance upon the teeth gives the orthodontist full opportunity for the expression of art.

FIG. 28.

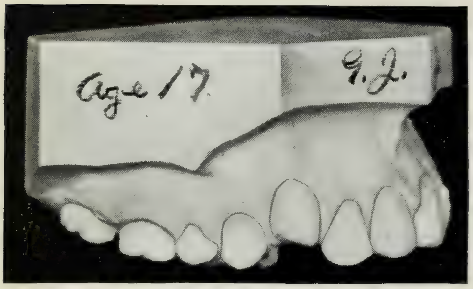
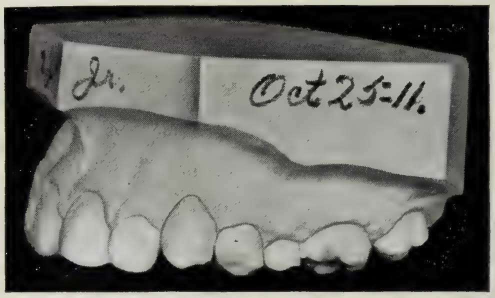
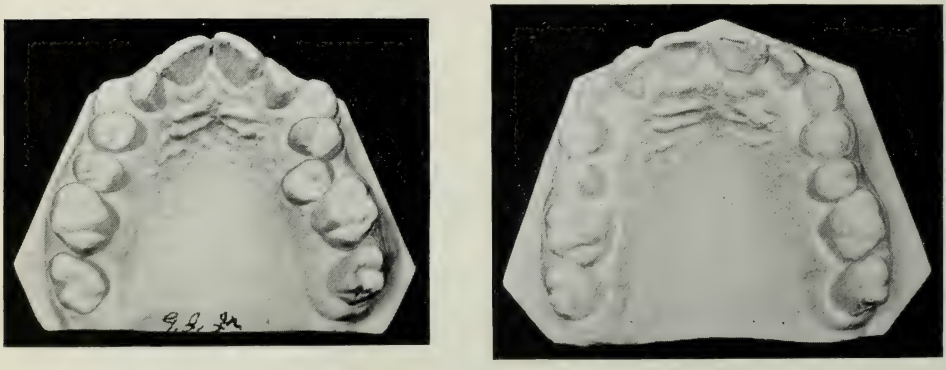


FIG. 29.



Finally, no other method of treatment offers such great possibilities in tissue development and in the ultimate establishment of artistic facial balance.

FIG. 30.



A PRACTICAL CASE.

The following is the description of a case now under treatment by Dr. A. H. Ketcham of Denver, this being one of the first cases to be treated by this method, and although it is not entirely completed, the excellent results from eleven months' wearing of the appliances are clearly demonstrated.

The case is that of a boy, age sixteen years, a typical case belonging to class I.

Figs. 23 and 24 show the malocclusion of the teeth and the pronounced arrest in the development of the bone at the time treatment was begun.

Fig. 25 illustrates the appliances originally placed on the natural teeth.

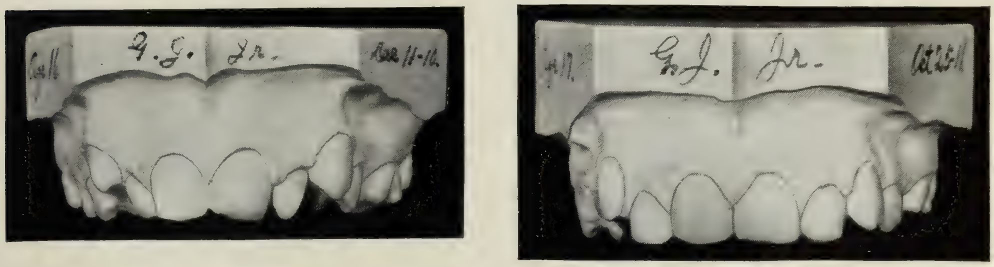
Fig. 26 shows the case one month after the beginning of treatment.

Fig. 27 illustrates the case ten months after the beginning of treatment, and Figs. 28 and 29 show the upper model of the case after eleven months of treatment.

Fig. 30 shows the case from the occlusal aspect at the time of beginning treatment and eleven months later (December 1911), and Fig. 31 shows the same models from the labial aspect.

Ample space has been gained for the eruption of the canines, and a study of these pictures will reveal that the roots of the upper anterior teeth have been shifted to a very noticeable degree, and that the bone has developed to nearly its normal contour. Probably two or three months more of treatment will be sufficient for the completion of this case, no retention being necessary.

Fig. 31.



The results of tooth movement and bone development in this history-making case, after only eleven months of treatment, have been truly remarkable, and are sufficient, we think, to awaken surprise and great enthusiasm in the mind of the thoughtful orthodontist, and to stimulate him to his best endeavors; for it is difficult to predict what possibilities of more rapid and satisfactory results may be in store for him who will familiarize himself with this plan of treatment and will master its technique.

SOME USES OF RADIOGRAPHY IN DENTISTRY.

By J. J. MOFFITT, D.D.S., Harrisburg, Pa.

(Read at the thirty-seventh annual meeting of the Lebanon Valley Dental Association, Lebanon, Pa., May 14, 1912.)

THE application of scientific methods to any branch of human activity tends to raise that particular trade or art or profession out of a state of experiment and uncertainty to a higher one in which desired results are obtained by certain definite procedures.

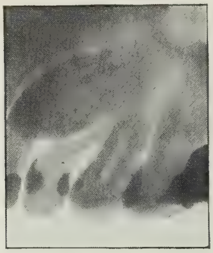
The use of the X-ray machine in dentistry is a very good example of this general truth. We dentists and our patients owe and will owe a great deal to the men who discovered, developed, and made practical this interesting and now indispensable transformation of light.

OFFICE OUTFIT FOR RADIOGRAPHY.

The special application of radiography to dentistry consists, usually, in having a small plate or film—preferably a film—so shaped that it may be placed directly behind and touching the tooth or teeth to be photographed, in order that the exact size may be obtained, and to guard against other objects being taken that may interfere with the reading.

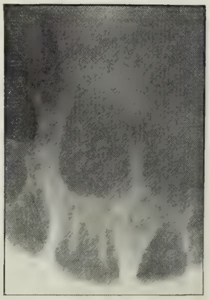
When the liquids and the accessories for developing are prepared in advance, and the dark-room is in readiness, these pictures may be completed in seven minutes. A girl assistant can learn to do this while the operator is doing preliminary work on the case, so that no time is lost. A large closet or any place from which all light-rays can be excluded makes a sufficiently good dark-room, and the time will come when this will be a regular part of a practicing dentist's outfit.

Fig. 1.



Impacted canine.

Fig. 2.

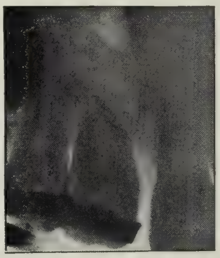


Fusion of deciduous central and lateral. Permanent lateral discovered back of canine.

INTERPRETING A RADIOGRAPH.

Considerable time must be spent in learning to read the films. The density of the shadow cast by each object in comparison with the others on the same film, and the positions of the objects and the condition of their surroundings, assist in determining the reading. The operator making the exposure can best read the film, as he knows and can make allowance for the direction from which the light came and the angle of the film. The length of exposure must be taken into account, as an upper third molar taken through the malar bone requires double the exposure of a lower incisor. The films are developed and finished within seven minutes while the patient is in the chair, and are examined for the purpose of diagnosis while wet. This somewhat affects the clearness of the prints made from them.

Fig. 3.



Root injured by fall. Lateral erupted directly back of central. Now being regulated.

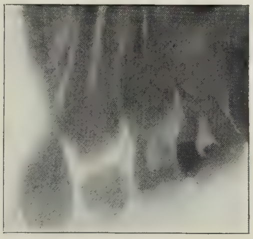
Many cases of interest, such as impacted teeth (Fig. 1), missing teeth (Fig. 2), broken roots (Fig. 3), supernumerary teeth or roots, cysts, malformations, etc., have of necessity been omitted.

PREPARING THE PATIENT.

Cases for radiographic work should be prepared in advance, with a view to getting as clear a picture as possible. Root-dressings, superfluous gutta-percha, tartar accumulations, and interfering fillings should be removed. Suspected punctures are often undetectable unless a small piece of wire is inserted through them, and the lingual roots of first bicuspids and molars are often obscure unless prepared in the same way.

DIAGNOSIS OF DISORDERS IN DECIDUOUS TEETH.

FIG. 4.



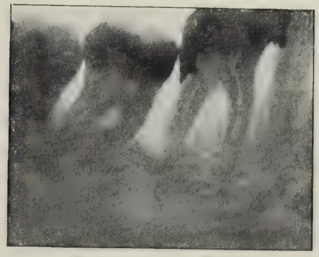
Impinging filling.

If a child is presented with a painful deciduous tooth and the operator is asked why it is hurting, he might say that an abscess is forming, or a permanent tooth is about to erupt, or another permanent tooth may be erupting irregularly and pressing against the aching tooth, or a supernumerary tooth may be forming, or the trouble may be due to a cyst; and he may add to the parent: "Just let it go for a few days and we shall be able to tell." Such an answer will not give the parents of the child a high opinion of the achievements of our profession, even though they may think that the operator's advice is the best that can be done for the child. Furthermore, those few days of suffering may intimidate the child against having operations done on the teeth. But if we take ten minutes to make a picture (Fig. 4), and see that a filling is impinging on the pulp and the pulp is dying, as no permanent tooth is yet erupting and no other untoward conditions are present, we diagnose the case at once, give the child an anesthetic, remove the pulp, fill the canals with the guidance of the picture, and, if we do not inoculate the apical tissue with bacteria from the mouth, the trouble is over. We have done our work scientifically, and have the satisfaction of knowing that it could not have been done better; while, if the abscess is allowed to form, the child will spend a feverish night and become fearful about the teeth. Furthermore, the process of curing the abscess is a long one, and the result in deciduous teeth is uncertain.

RADIOGRAPHS IN PYORRHEA ALVEOLARIS.

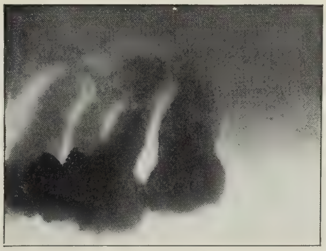
If a patient with pyorrhea alveolaris seeks our advice as to whether extraction is necessary or whether or not treatment will tighten the teeth, or asks any of the other questions that this unfortunate disorder elicits, a radiograph of the case will very often aid us in making a definite decision (Figs. 5, 6). If a tooth is loose but has a fairly good alveolar process, and the looseness is due to a swollen pericementum, it is safe to say that treatment will tighten the tooth. If the alveolar process is absorbed almost to the apex, but the pulp is vital, the tooth or teeth thus affected may be supported by those that have strong processes. If the disease

FIG. 5.



Pyorrhea alveolaris.

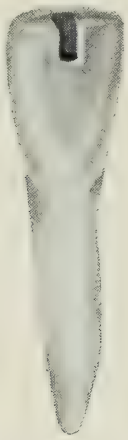
FIG. 6.



Pulp of bicuspid destroyed by pyorrhea alveolaris.

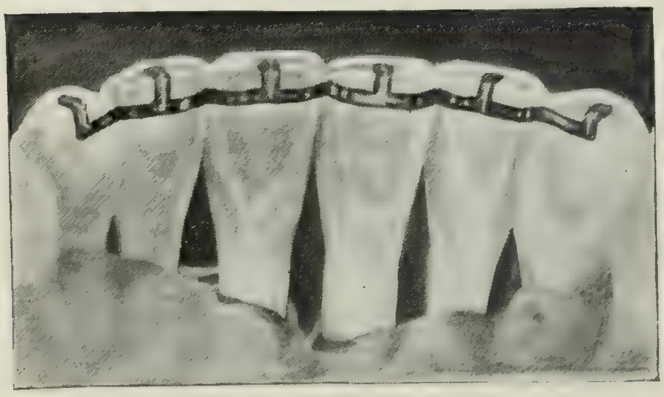
has progressed beyond the apex and the pulp is dead, the roots may first be filled. Indecision and uncertainty are thus done away with, and a definite course of treatment is outlined at once. The best method I have found for supporting teeth loosened by pyorrhea is to secure the teeth in their correct position by supporting them labially with modeling compound, having first prepared them by cutting a slot on the lingual side from the occlusal edge about an eighth of an inch down the enamel (Fig. 7), and deeper on the inside to the extent of about three-sixteenths of an inch (Fig. 8). These cavities thus prepared are oiled slightly with olive oil, and, the teeth being supported by the modeling compound, are filled with impression wax. A thin piece of wax is then laid around, uniting all these wax fillings. The piece is chilled, sprues are attached, and the brace is removed, cast, and polished. A brace of this kind (Fig. 9) does away with the lateral pressure of wiring and the unsightliness and uncleanliness of banding.

Fig. 7.



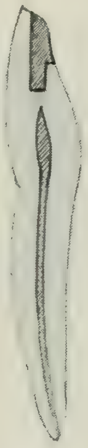
Method of preparing tooth for pyorrhea brace.

Fig. 9.



Lingual view of brace.

Fig. 8.

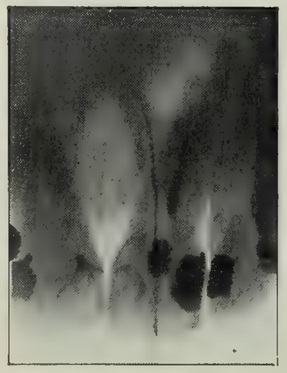


Sectional view.

CARE OF ROOT-PERFORATIONS.

One of the most trying conditions which a dentist encounters is puncture of the root or pulp chamber of a tooth (Fig. 10). The fact that a puncture is usually found where a root was supposed to have been, or where a root makes a sudden turn, induces the instruments used in subsequent explorations to follow the wrong path, and renders entry into the real root-canal extremely difficult. The inaccessible portion of the root remains putrescent; strong drugs used in

Fig. 10.



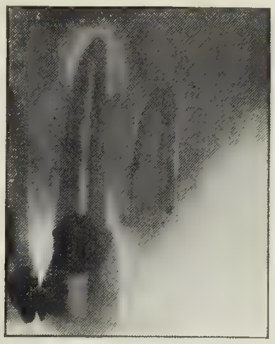
Punctured root.

the canal dressings and escaping through the puncture, and the mechanical irritation from instruments, all combine to increase the dentist's difficulties, and make the tooth seem incurable; but if the direction of the root can be determined, and the puncture located and avoided, the apical portion can very often be cleansed. Small punctures so treated very often heal up of their own accord, and under the influence of mild antiseptics. Larger punctures may be closed with gold castings, platinum tubes, etc. The most satisfactory method of closing up a puncture is first to obtain a correct idea of the shape of the subgingival portion of the tooth by means of one or more radiographs, then to place a little cement beyond the puncture, and into this cement introduce the edge of a piece of platinum foil. The platinum foil, having been so shaped that it will cover the puncture, is held by its edge until the cement has set, when it is sterilized with alcohol and hot air and then gently burnished over the opening. A layer of cement is then laid over the foil, sealing it tightly into place, and when this cement is set, all protruding portions thereof are removed, and the canal is carefully rounded out with a root-canal drill.

DIAGNOSIS OF OBSCURE ABSCESSES.

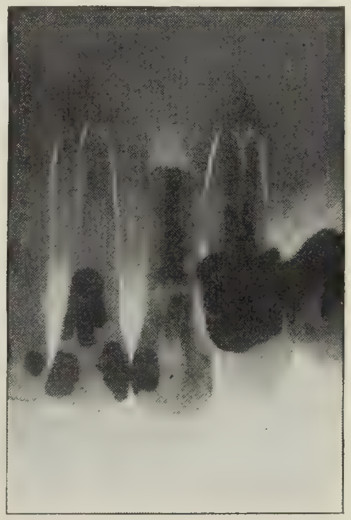
In diagnosis of obscure abscesses, radiographs have proved themselves useful in many ways. In the spring of 1911, I inserted a bridge extending from a first bicuspid root to a first molar. In the fall the patient returned to me with a fistulous opening, above and posterior to this root, discharging a copious quantity of pus. I removed the bridge, destroying the anchorage on the molar, and carefully loosening the anchorage at the bicuspid end, which had been obtained by a casting extending into both root-canals. Upon removing the root-canal fillings I could find nothing to indicate an abscessed condition nor any connection with the fistulous opening. Then I did what I had neglected to do in the first place—made a radiograph of the region. The location of the abscess had appeared to leave no doubt as to its cause, and as I had myself removed the pulp of the first bicuspid and had done all the root-canal treatment and filling that had ever been applied to that tooth, I was inclined to blame my workmanship. The radiograph, however, showed an abscess (Fig. 11) at the apex of the canine, and a fistulous tract extending from it in the direction of the opening posterior to the root at first suspected. This canine had a large distal gold filling of many years' standing, and a cervical filling on the labial side. The pulp had succumbed to the influence of these fillings during the summer, and was in a highly putrescent condition. The radiograph clearly indicated the necessity of amputation of the apex. As soon as this had been carried out the tooth was

Fig. 11.



Abscess at apex of canine.

Fig. 12.



Canine root filled, apex amputated, and temporary bridge replaced on first bicuspid.

treated, and the condition cleared up and the fistula closed. I replaced the bridge, and no further trouble occurred (Fig. 12). Had I made the radiograph in the first place, the abscess would have been located and the work of removing and replacing the bridge avoided. There was no outward indication that the canine was affected, and both patient and operator were sure that the cause of the trouble was situated beneath the anterior attachment of the bridge.

Another example of an obscure abscess located by means of a radiograph was a case in which an incurable fistula was discharging in the depression where the first bicuspid roots had been extracted. The canine and second bicuspid were in good condition, and an involvement of the antrum or a root fragment was suspected as being the cause. The radiograph showed an abscess tract above the lateral incisor. When this tooth was opened the pulp was found to be putrescent, having been destroyed by an impinging approximal filling. Antiseptics forced into this tooth, after the root had been cleansed, appeared at the fistulous opening referred to, which soon closed up; the tooth was shortly afterward filled, with no further trouble.

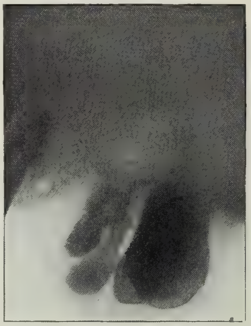
THE RADIOGRAPH AS AN AID IN ROOT AMPUTATION.

The radiograph is invaluable in chronic alveolar abscess, in determining the advisability of performing the operation of amputation of the apex, in viewing the root-filling preparatory to this operation, in measuring the place to make the incision, and in discovering the location of a missing apex after the root has been amputated. If in an upper tooth the apex is projecting into a pus cavity, and the lower part of the root and pericementum is in good condition, the apex may be cut off on a line with the bottom of the abscess tract, after the insertion of a root-filling, and success usually follows. In lower teeth, if the abscess tract has extended fairly deeply into the cancellated bone, this fact is noted, and the incision is made so that curetting and drainage of the tract can be effectively accomplished after the amputation.

ABSORPTION OF ROOTS DISCLOSED BY THE RADIOGRAPH.

One of the most interesting revelations made by the X-ray apparatus I have recently seen in a case of a man over fifty years of age. The pulp of the first bicuspid had been exposed by caries, and was removed by cocain anesthesia. The pulp chamber seemed to continue right up the center with no constriction or openings into root-canals such as we usually find. When the case was referred to me I thought the assistant had mistaken it for a second bicuspid and had punctured the floor of the pulp chamber. Exploration on either side of this failed to disclose any root-canal openings, and the probe could be passed so far upward through the supposed puncture that it seemed to be in the antrum almost to the bottom of the orbit. The radiograph showed that there had at one time been a large abscess in the bone above the second bicuspid, which tooth was missing. The entire apex of the first bicuspid had been absorbed so that it extended but a short distance beneath the gingival area, and the root had the appearance of an absorbed deciduous tooth. Vital tissue had entirely filled the abscess tract, and the vitality of the pulp had in some remarkable way been preserved. The tooth is

Fig. 13.



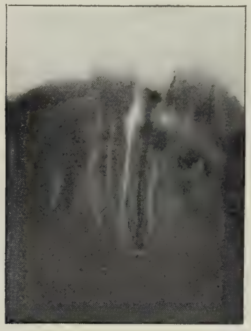
A similar case of an absorbed second bicuspid root.

now in apparently good condition, having a dressing arranged for drainage, and the open root-end will subsequently be closed up with a gold casting.* (See Fig. 13.)

DIAGNOSIS OF PULP-STONES CAUSING NEURALGIA.

A short time ago a man called on me to see what could be done for the relief of some deep-seated pains that extended all over the side of his head, but which seemed to him at times to be localized in his two lower central incisors. One of these, the right central, was broken down occlusally and some years previously had been devitalized and the root-canal filled. The left central was intact, but the patient felt sure the pain lay between the two teeth. The acute neuralgic condition of the left side of the head was incompatible with the supposition that the trouble arose from the right central incisor, there being no local outward manifestations, unless perhaps there was a deep-seated pus tract in the bone. Examination with the radiograph (Fig. 14) showed the root-filling in the lower right central to be beyond criticism, but no pulp chamber appeared in the left central, although the tooth was vital. It seemed best to open this tooth to make an exploratory operation, since the patient's condition was serious, owing to loss of sleep and continued severe suffering. Nitrous oxid and oxygen were administered until access to the pulp was gained; the opening was packed tightly with cocain held in with gutta-percha, and the patient was allowed to become conscious. All pain had entirely disappeared. Upon being opened farther, the tooth was found to contain a large pulp-stone, pear-shaped and almost as large as the pulp chamber. There has been no recurrence of the neuralgia since the removal of this pulpstone.

FIG. 14.

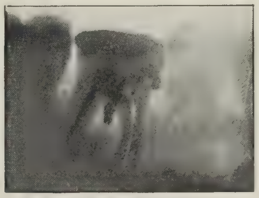


Pulp-stone in lower left central. Old abscess tract from previous trouble with right central was filled with gingival tissue.

DIAGNOSIS OF ABSCESSES OF PROLONGED DURATION.

When in cases of long standing abscess the patient asks if the tooth must be extracted or whether there may be hope of recovery, the radiograph is indispensable. Since abscesses are not a natural condition, there must be a definite cause for each one. Nature will correct the condition, if the cause can be ascertained and removed. Removing a cause without knowing exactly what that cause is, is a matter of chance or experiment, and not scientific. For instance, a patient applied recently for an opinion as to the possibility of saving an only molar, a lower one. It had two fistulas, one labially the other lingually. These had been variously treated and irrigated for a period of six or eight months, and the

FIG. 15.



Puncture of floor of pulp chamber.

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* Since writing this paper, this case has been examined and completed by making and inserting a gold casting of the interior of the root, and another one restoring the contour of the crown.

tooth had finally been given up as hopeless. The antiseptics, I was told, would go through the tooth and out through both fistulas, but the abnormal condition persisted. A radiograph (Fig. 15) showed the posterior root-filling in good condition, a puncture in the floor of the pulp chamber, through which a gutta-percha root-filling was projecting into the surrounding tissue, and no filling at all in the anterior root, which was set unusually far forward. This anterior root was difficult of access, and in some way the operator had been led to fill a puncture. When the projecting gutta-percha had been removed, the anterior root cleansed and filled, and the puncture closed with a gold casting, the condition healed up as if by magic. The patient thought that this was wonderful; in reality it was nothing but science and nature—two able assistants within the reach of everyone.

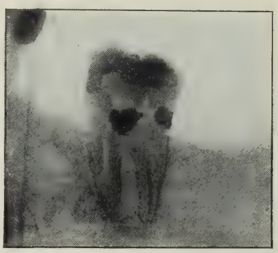
DIAGNOSIS IN CASES OF TRIFACIAL NEURALGIA.

Trifacial neuralgia, with all its painful and serious manifestations, often presents serious problems to the dentist. It embraces all the conditions from the short sharp twitches of its early stages to unendurable suffering and serious mental disturbances.

From the cases that have come under my observation it seems that this malady excepting when due to impacted teeth and malformations is caused either by pulp-stones or by granular deposits in the pulp tissue. The pain is seldom localized, but it is usually reflected to other parts of the trifacial system, finally inflaming the entire nerve. The less serious cases are caused by one or more stones in the pulp chamber of a single tooth, in which, there being room for the adjustment of the tissue, the pain often subsides if no further deposit occurs. The more serious cases are due to a number of stones in several teeth, producing continued irritation, and the worst cases, in which the pain becomes unendurable and the reason of the individual is assailed, arise from the granular deposition of salts in the root-canals, being most serious when the deposition occurs near the apex. An illustration of the invaluable assistance of the radiograph is shown in the following case:

A man of about seventy years of age came to me suffering with trifacial neuralgia of the worst form. There was no particular reason to suspect the teeth, but other resources had been exhausted. When a man of this age arises at five o'clock in the morning in order to try to divert himself in his billiard-room, and drinks black coffee to help him to endure the suffering, his condition is serious. He said that he sometimes wished he were dead. I examined his teeth and was convinced that his trouble was not odontalgia, but started to make radiographs of his molars. In the upper right first molar there were evidences of pulp-stones, and in the posterior root of the lower right first molar (Fig. 16) a condition was apparent strongly resembling a root-filling, though it extended from the apex only about three-quarters of the length of the root, the pulp chamber being in evidence, and the tooth never having been opened. As the upper tooth seemed in the worse condition, the patient was anesthetized, and an opening made into the pulp chamber. A pulp-stone and a quantity of granular deposits were removed from the lingual root. The pulp was found to be dead, and the gases were evidently escaping in a pocket at the distal portion of the lingual root, where the gums were much receded. Hoping this would give relief, the patient was given an appointment for

Fig. 16.



Calcareous cast in molar root.

the following day. He returned, having passed a night of his usual suffering, but hopeful that we were on the right track. He was then anesthetized, and the lower first molar was opened. The pulp was vital and in apparently good condition, but when it was removed and examined, there was clinging to it a cast of almost the entire posterior root, consisting of a finely granular deposit. When the patient was restored to consciousness all his pain had vanished, nor has it since recurred, and he has been grateful ever since to the discoverer of this wonderful addition to the dentist's resources—Roentgen.

BUCCAL FLANGES AS AN AID IN RETAINING DENTURES.

By J. L. ELPHINSTONE, D.D.S., L.D.S., Aberdeen, Scotland.

DR. Haskell says, in his "Manual of Plate Work," on page 44, in speaking of full lower dentures: "I have found that a flange on each side is an advantage in that the cheeks help hold the plate down and keep it from moving forward."

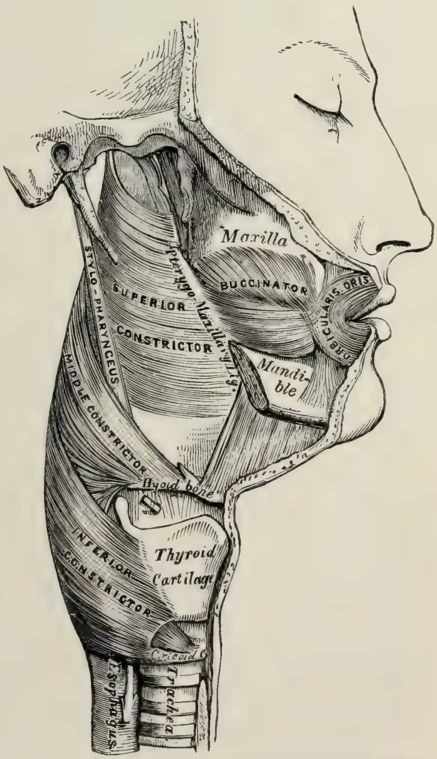
THE BUCCINATOR MUSCLE AS A FACTOR IN RETENTION.

The agent of this retention is the buccinator muscle, which is thus described by Gray:

"The buccinator is a broad, thin muscle, quadrilateral in form, which occupies the interval between the jaws at the side of the face. It arises from the outer surfaces of the alveolar processes of the upper and lower jaws corresponding to the three molar teeth, and behind from the anterior border of the pterygo-maxillary ligament. The fibers converge toward the angle of the mouth, where the central fibers intersect each other, those from below being continuous with the upper segment of the orbicularis oris, and those from above with the inferior segment. The highest and lowest fibers continue forward uninterruptedly into the corresponding segment of the lip without decussation."

The muscle is, however, quadrilateral only when the mouth is wide open. When the mouth shuts, the muscle folds on itself like a half-closed book, with the back of the fold pressing against the

FIG. 1.

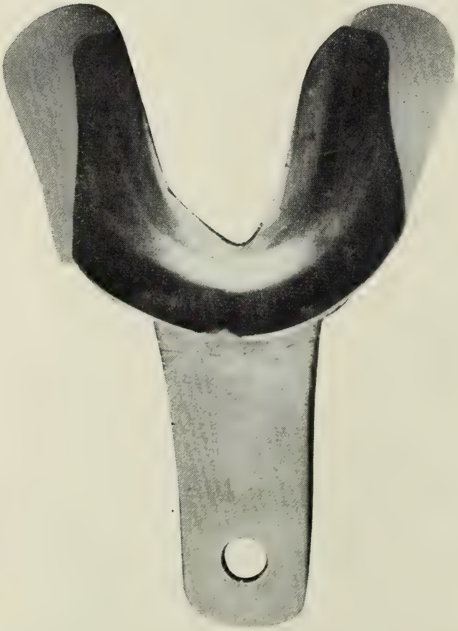


—*Gray's Anatomy.*

Shows the horizontal course of the lower fibers, favoring the wide flange.

molars and bicuspids, while under and above the muscle so folded, lateral flanges on the rims of a denture can obtain good retention. It may also be noted that a straight line drawn between the anterior and posterior attachments of the muscle passes between the masticating surfaces of the molars. But the tendency to lie in this position is controlled by the fibers attached to the alveolar processes, which, by contracting, save the muscle from being bitten, and also bestow on it some latitude as regards the position which it occupies, and enable the dentist to some extent to vary the position and size of the flanges of his dentures.

Fig. 2.

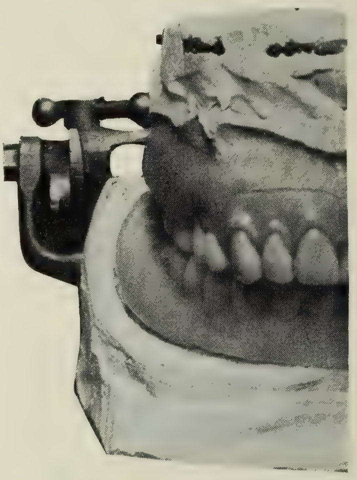


Impression tray, cut away at sides and heel, and the parts supplied in wax suitably trimmed and bent.

MAKING LOWER DENTURES WITH BUCCAL FLANGES.

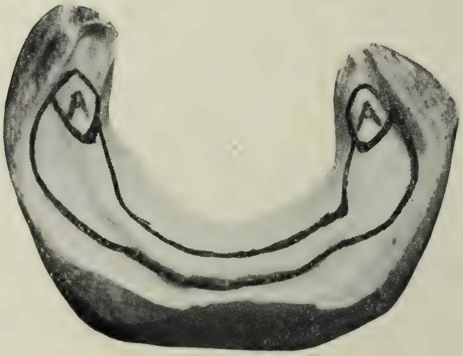
In lower dentures, the flange can be worn fairly wide and much farther back than usual, and by this means strong suction as well as a grip is obtained. An endeavor should be made to obtain a model showing the cheek with as little displacement as possible. A metal tray of suitable size is selected; a portion of the heel and outer rim is cut away, and is replaced with sheet wax suitably bent and trimmed in such a manner that it may be possible to take an impression in soft plaster of a portion of the cheek

Fig. 3.



Flanges modeled on wax.

Fig. 4.



Outline of lower plate, marked on model. A, A, Parts to be relieved by filing the under surface of the plate for attachments to constrictor and buccinator.

without showing any distension. The model thus obtained shows the fold of the buccinator, a little indistinctly, however, and it is desirable to carve it out more plainly to allow a well-marked flange to lie under it.

After making the model, a trial plate on which the flanges are modeled is made and tried in the mouth. This gives the best idea how wide and how far back to carry them.

The flange should begin at about the first bicuspid, carefully avoiding the frena found anterior to this region. It gradually widens to the first molar, when it begins to diminish again in width as it passes farther back, to rise in front of the ramus to a height which just clears the upper plate. The under surface of the flange should be well relieved, so that the distension of the cheek in opening the mouth does not raise the lower plate. The outer margin should be rounded and fairly thick so as not to cut into the tissues. The upper surface of the flange slopes upward from the outer margin to the necks of the teeth, and in order to allow extra body in the flange, it may be advisable sometimes to use shallow molars or to allow deeper ones to be well covered with vulcanite.

Where it rises in front of the ramus, the under surface of the plate must be a little filed away just over the summit of the ridge. The point to be relieved is well marked on the model as a tuberosity just in front of the ramus. This removes pressure over the attachment of the superior constrictor and of the buccinator.

On the lingual side the plate is not extended farther than usual, as there is no way of avoiding injury to the constrictor behind and the mylo-hyoid below.

It will now be found that the cheek lies over the flange and in front of its ascending part, so as to resist any force tending to move the plate upward or forward, and with every closure of the mouth the simultaneous contraction of the buccinator holds the plate securely. This retention is the more favorable in that it is exerted symmetrically on each side, even when one side only is masticating.

RESTORING FULNESS OF CHEEKS.

Often patients, on first using any form of denture, bite the cheeks. The flange is an aid in enabling them to keep the cheeks out of the way of injury. Besides, the flange is an aid in restoring the proper fulness of the cheeks.

It is sometimes difficult to realize how the cheeks fall in because of the loss of the teeth. We are apt to confine our efforts to restoring the fulness of the lips. This was brought to my notice by a patient who came to me after the recent extraction of his upper molars and bicuspids on one side only.

He returned to me after two years, when the right side, which was normal, seemed quite swollen in comparison with the left. At the first glance I thought he had a gumboil. Had the extractions been symmetrical on each side, I should have quite failed to appreciate the extent of the falling-in of the cheeks.

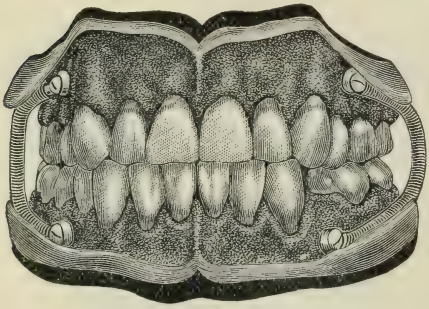
EXTENT OF THE FLANGES.

The flanges should be made a little wider and extended farther back than it is thought will be really required, and the surplus should be filed away when the denture is fitted into the mouth. The highest external angle of the flange is particularly liable to abrade the tissues just external to the ramus. Here the fibers of the buccinator horizontally cross the edge of the nearly vertical extremity of the flange, as they pass across the front of the ramus to join the pterygo-mandibular ligament.

A little practice will enable the operator to estimate how much can be borne, but if the flange is left too large, it must be trimmed away again when the patient returns with a sore mouth. It is important not to carry the flange farther downward than it would be on an ordinary plate; the extension must be entirely lateral and backward.

The old spiral springs with their flanges for protecting the cheeks lay just in the position occupied by these flanges, and doubtless this had a great deal to do with their usefulness. The reason for the remarkable tolerance by the tissues of a wide flange on a lower plate is that the buccinator in its lower fibers runs horizontal and thus parallel with the flanges. Had the fibers crossed the margins of the flange, it would have been necessary to make it narrower.

FIG. 5.



Shows flanges, which, supplemented by the springs themselves, take advantage of this retention. (Essig's "Text-book of Prosthetic Dentistry.")

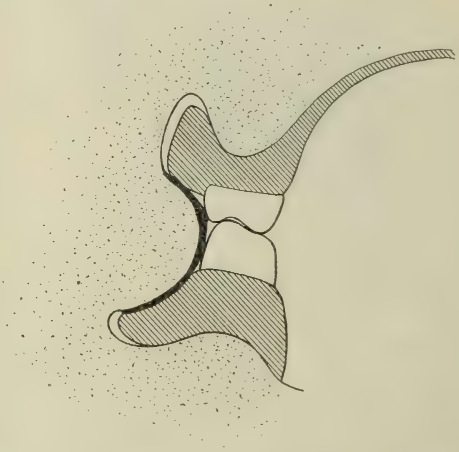
UPPER DENTURES WITH FLANGES.

The fibers of the upper part of the buccinator are more vertical in direction, and for this reason the flange on the upper plate must be made smaller, and it is not so useful as the lower. Fortunately a good suction is usually obtainable in the upper denture.

The rim of the plate should be carried to the usual height, that is, as high as it can be borne with comfort, and without abrading the cheek. Opposite the second bicuspids and molars the flange should descend from the top margin at an inclination of between 20 and 30 degrees to the vertical, sloping outward. This abrupt slope enables the plate to escape the downward displacing action of the buccinator. Then, at a short distance above the necks of the teeth, the flange takes an inward turn which reaches the necks of the teeth in a curve. The flange thus produced is intended to lie over the bulge of the muscle, and so catch its retention. The original contour of the natural upper alveolar margin is thus approximately restored, while no attempt is made to locate the teeth themselves otherwise than in the usual artificial denture; that is to say, they will be placed inside the line of the natural teeth.

Generally the alveolar ridge is of such a shape that the plate naturally lies over the buccinator bulge, and all we have to do is to insure that this tendency is accentuated in shaping the plate. Mismanagement may result in the buccinator displacing the denture instead of supporting it.

FIG. 6.



Sectional diagram in molar region, showing cheek overlying the flanges.

OVERCOMING DISPLACING ACTION OF CHEEK MUSCLES.

Much has been written of this displacing action of the cheek muscles, but it is only necessary so to arrange the flange that it receives support from the muscle, while the teeth themselves are protected from the too strong pressure which would have a displacing effect. This may be effected in various ways. The flange may be made extra prominent, or the teeth may be set a little farther in, or again, the teeth may be shortened and the flange brought farther down. But in whatever way it is managed, the pressure under the flange must be greater than the pressure on the teeth, or above the flange.

COMPENSATING FOR THE SETTLING OF DENTURES INTO GUMS.

Like all other dentists, after supplying well-fitted double dentures, I find that within a short time the settling of the plates into the gums interferes with the articulation and produces movement in one or both sets. This settling into the gums is a matter which receives little mention in dental literature, and yet it is a disturbing factor so great as to necessitate always the grinding of cusps and often the remaking of either one of the plates. Formerly I had more complaints about lower sets, as the defect in articulation caused its weaker retention to yield to the strong suction of the upper plate. Since bringing the flange retention into use I have received more complaints about the upper denture; so effective is this retention of lower plates that an upper plate, even with good suction, often yields to it.

Adjusting the articulation, of course, re-establishes the fit and compensates for the settling-in.

SOME OPPORTUNITIES IN PROSTHETIC DENTISTRY AFFORDED BY THE CASTING PROCESS.

By ELLISON HILLYER, D.D.S., Sc.D., New York, N. Y.

(Read before the Fourth District Dental Society of the State of New York, at its annual meeting, Schenectady, N. Y., November 21, 1911.)

THE term prosthesis in surgery means the construction and application of an artificial substitute for a lost part of the human body, and in dental surgery has special reference to the making and insertion of a fixed or removable restoration within the oral cavity. When facial prosthesis is included, the field of operation extends to parts of the face contiguous to the oral cavity.

The field of operative dentistry differs from that of prosthetic dentistry, in so far as restoration of contours, etc., is concerned, in that the restorations are made in the tooth *in situ*.

The line of demarcation between the fields of operative and prosthetic dental practice has for many years been growing less and less definite. Many years ago, operative procedure, confined to gold and plastic fillings, held to its limits with no thought of intrusion by the then known prosthetic procedures.

THE BURNISHED MATRIX GOLD AND PORCELAIN INLAY.

Some time before the cast gold inlay came into practice, the use of pure gold plate burnished to the cavity, either directly in the tooth or in a die constructed from an impression of the cavity, afforded an opportunity for restoration. This pure gold base was subsequently contoured to the desired form by means of gold solder, or, where stress was not excessive, by means of porcelain. This latter restoration produced an artistic result with but the very thin line of the gold base showing around the edge of the porcelain. Several such fillings which were inserted at least fifteen years ago are giving excellent service.

This method of restoration marked the beginning of the breaking-down of the division wall between the operative and prosthetic fields. Since the advent of the casting process, many restorations which previously had been accomplished by operative methods only, have been performed according to prosthetic procedure.

THE GOLD SHELL CROWN AND ITS SHORTCOMINGS.

The introduction of this process has been the means of enlarging the scope of operations in many directions, making it possible to restore lost parts with much greater accuracy and more artistic results. Many teeth, particularly molars, which when badly broken down by caries were formerly doomed to the process of cutting down and crowning with a shell crown, have, after proper root-canal treatment, and shaping of the remaining walls, been restored to contour by a cast inlay, which is superior in every way to the capping method. The shell crown has been in existence for forty years. During those forty years there has been much abuse of this method of restoration. Many operators have always taken the precaution to properly prepare a tooth or root to be crowned, but others have been satisfied to make a fairly close adaptation at the gingival margin, using very little care in contouring to approximal contact, and being content with almost any kind of occlusion.

To this apparent laxity there has been added on the part of some the tendency to grasp this means of obtaining larger returns for small expenditure of time and material by the use of shells of a gage of insufficient thickness to withstand stress, little or no attempt being made to reinforce the occlusal surface. These practices have provoked just criticism. The results have been far-reaching, because badly fitted bands have been the source of much irritation and subsequent inflammation, resulting in many cases in loss of the roots crowned. Occlusal surfaces perforated through stress of mastication have required either repair or replacement, accompanied in some instances by great loss of tooth structure.

In stating this situation I do not wish to be misunderstood as implying that proper results cannot be obtained by old methods, for, in the hands of many, an almost perfect degree of workmanship is obtained today, but in every case it is accomplished with infinite care in the preparation of the roots and the shaping of the walls, adapting and contouring the bands, preparing a properly carved occlusal surface according to the anatomical requirements of the case, providing sufficient reinforcement of the cusps, and finally, careful finishing, adjusting, and setting.

THE CAST GOLD CROWN.

With the cast gold crown the opportunity for obtaining an absolute adaptation to every requirement is so greatly enlarged that it seems to the writer that before long practically all methods of constructing gold crowns will give way before this one.

The first attempt to construct a crown by this method was made by banding the prepared root with 30-gage platinum; after waxing to the contour, the portion of wax which had been forced into the occlusal end of the band was mechanically removed as far as desired, the model was invested, and duly cast. The result was a crown of perfect contour and reinforced in every direction, which would withstand any stress of mastication that might be applied to it.

An improvement upon this original method was suggested shortly afterward by adding a plate to the occlusal end of the band. This cope thus became quite strong, even when a much thinner band of iridio-platinum was used; 35 gage makes an excellent band, and may be soldered either with platinum solder or high-grade gold solder. This cope [exhibiting], affording a complete closure over the root, makes it possible to confine the contour to the desired thickness in all directions, and also, if extended just below the cast restoration, admits of the possibility of thoroughly burnishing the gingival portion at the final adjustment in the mouth.

CAST GOLD INLAYS FOR BRIDGE ATTACHMENTS.

This process is applicable to any case, no matter how difficult, that admits of the adaptation of a firm band attachment. It provides for the saving of divided roots of molars, or for the restoration of molars in which one or two roots are entirely gone. An extreme case of this latter description I am treating at present. The upper first molar is entirely gone with the exception of the disto-buccal root, which, strange to say, is as solid as the roots of any tooth in the arch. After thoroughly testing its strength, treating and filling it, I am preparing to use it in the manner previously described, by constructing a cope and extending the contour upon the cantilever principle to approximal contact with the second bicuspid, thus filling up the occlusal surface.

Fortunately, a disto-occlusal filling in the second bicuspid renders it feasible to construct an inlay to which the crown can be soldered. When finished, this crown will have a solid attachment mesially upon the second bicuspid, and distally upon the disto-buccal root of the first molar.

The use of cast gold inlays as attachments for fixed bridges has afforded another great opportunity. It is a conceded fact that all crowns attached by a band are more or less a source of irritation. The use of a cast gold anchorage does away with this chance of irritation and makes a strong attachment that can easily be kept in a sanitary condition. In the anterior part of the arches it affords a strong support with a minimum display of gold, a result for which we should be extremely thankful.

THE DYNAMICS OF BRIDGE WORK.

The dynamics of bridge work has been in many cases seriously overlooked, and many teeth have met an untimely end when used as anchorages for bridges which they should never have been required to carry.

As an illustration, note this specimen [exhibiting] of an upper right lateral incisor upon which has been placed a poorly constructed open-face crown, attached to which is a central incisor pontic with an added labio-lingual lug to rest upon the left central incisor to prevent movement labially or lingually. Under light stress this restoration might last for some time, yet it is too great a burden to place upon a lateral incisor, and will result, as in this case, in the loss of the lateral. This is a mild case of abuse such as comes under every practitioner's observation, viz, bicuspids and molars carrying loads which must eventually bring about their ruin.

The crowning of anterior teeth with gold for the purpose of either capping or bridge anchorage, with rare exceptions, has been discountenanced by most practitioners for years. The open-face crown was a partial solution of this problem. Many excellent and properly constructed specimens of this crown have been adapted and inserted in mouths where the secretions seem to have little, if any, effect upon the cement; but for one such case there are scores where this attachment has been the insidious means of the destruction of the enamel under the capped portion, shortening the life and usefulness of the tooth.

The cast inlay has now made such an attachment entirely unnecessary. If cavity depth sufficient to insure the strength of the attachment cannot be secured in a tooth, I would much prefer to sacrifice the pulp and after proper treatment use the root-canal for the purpose of a dowel attachment in conjunction with the inlay. Many teeth will afford amply strong attachments without interference with the vitality of the pulp.

CAST BASES FOR PORCELAIN CROWNS.

The opportunity to cast bases for crowns, especially when serious inroads have been made by caries, is another great field which has been offered for improvement. These bases are applicable to any porcelain crown restoration. The application to a fixed dowel crown, such as the Logan or detachable crown, the Davis or kindred crowns, has made it possible to secure a much closer adaptation to the root than was formerly obtained by grinding.

CAST GOLD BRIDGES.

Cast gold bridges admit a greater amount of natural restoration than it was possible to obtain previously. In the construction of such bridges the use of replaceable teeth plays a large part. The Steele facings, Goslee's interchangeable, and the Evslin facings are excellent for such work. In the construction of such bridges the anchorages and pontic portion should be cast separately, and adjusted in the mouth for trial. The impression and occlusion, with the anchorages in position, should then be taken; the pontic portion, with the porcelain facings laid aside, should be united by solder to the anchorages; after finishing, the porcelain facings can be adjusted in their positions and the bridge is ready for setting.

CAST PYORRHEA SPLINTS.

The casting of splints for pyorrheal teeth—a distinctly prosthetic procedure, though perhaps not absolutely answering to the definition of prosthesis—is another field of usefulness which has been opened. Whether upon the occlusal surfaces of molars and bicuspids or upon lingual surfaces of incisors, these cast splints, with their closeness of adaptation, have supplanted other methods of banding and ligation.

It would be unwise, in this brief paper, to open the consideration of the question of the advisability of devitalization in connection with these pyorrheal teeth to be splinted. The possibility of using dowels in connection with the contour castings in many cases has proved very efficacious. Splints adapted with small iridio-platinum pins, however, afford strong attachment, constituting, in many instances all that is required.

CAST GOLD PLATE DENTURES.

The writer is not prepared to be over-enthusiastic about the casting of gold plate dentures in one casting. When the denture can be cast in sections, the tendency to slight change, which is the difficulty in large castings, may be overcome. The casting of small partial dentures and bar dentures is giving great satisfaction. There is a broad field of investigation and experiment open in that direction, however, before the stage that has been attained by other branches of the casting art will be reached.

The illustrations shown are gathered from various sources. I am indebted, however, to Dr. Goslee for most of them, and I desire to express to him my profound appreciation of what he has done in this field and for the various treatises upon the subject that he has placed in the hands of the profession.

Laying aside any personal consideration which any practitioner may hold regarding process patents, etc., I am certain that all will agree with me that the profession, and the world at large, owes to one man more than they will ever be able to pay; it is he who has offered us these great opportunities—namely, Dr. W. H. Taggart.

REPORT OF THE COMMITTEE ON PRACTICE.

(Dental Society of the State of New York.)

By F. P. HAMLET, D.D.S., Hempstead, L. I., N. Y.,

CHAIRMAN OF THE COMMITTEE.

(Read before the Dental Society of the State of New York, at its annual meeting, at Albany, May 9, 1912.)

IN previous years the work of this committee was intrusted to one man, officially styled Committee on Practice, whose duty it was to review the field of dental practice and to present to this society matters of real and vital importance, especially new methods and theories, for discussion and deliberation, and to broaden the field of dental possibilities. Your president considered that the duties of this committee were so important that he originated the idea of appointing a larger number to serve, and accordingly appointed Dr. W. D. Tracy and Dr. D. H. Squires. This was indeed expedient, for it warrants a better and larger report. As chairman, I delegated Dr. Tracy to report on matters of operative dentistry, and Dr. Squires on matters of scientific development.

When I received their reports I found that they covered the field of dental practice so fully that there was nothing left for me but the study of toxic secretions from inflamed tissues, so I have reported on oral sepsis, and questions relative thereto.

(I.)

Operative Dentistry.

REPORTED BY DR. W. D. TRACY.

It is safe to state that the general trend of operative procedure is today on a higher plane than it ever was before in the history of the dental profession. The larger number of men who have a scientific grasp and understanding of what a normal denture really is, and who have a broad appreciation of what its perfect function means to the patient, is proof of this fact.

In stating that the general trend of operative procedure is on a higher plane than it ever was before, the writer does not wish to seem forgetful of the many splendid men whose names are indelibly written on the pages of dental history, nor is there any lack of appreciation on his part of the excellence of their individual operations.

MODERN APPRECIATION OF OCCLUSION.

In fact, the present position of dentistry is due to the splendid practical work and to the scientific research of the best men in the profession during the last few generations; but at no time has there been so much importance attached to the mouth and teeth as the functionating organs in the process of mastication as is the case today.

The special study of occlusion and the importance of its relation to the welfare of the teeth, individually and collectively, has contributed most valuable information to the operative dentist, and has furnished the foundation on which the specialty of orthodontia has been built.

The knowledge of the laws of occlusion which the profession has acquired in the last two decades has really made the general practitioner look upon the teeth from an entirely different viewpoint, and at the present time the loss of a permanent molar does not mean that a space will be left, but that a malocclusion will be produced which will materially diminish the masticating efficiency of the patient. It means that the teeth adjoining the space will have a tendency to tip in the direction of least resistance, and that the loss of approximal contact due to the tipping of the teeth will eventually invite a pyorrheal condition in a large percentage of cases.

This change in the position of teeth adjoining an extracted molar and their subsequent affection with pyorrhea, or at least with a considerable loss of their supporting tissues, further reduces their efficiency, and, in many instances, the relations on the side of the mouth where the extraction occurred are so unbalanced that normal mastication is rendered practically impossible.

These conditions following extraction have always prevailed, but the point your committee wishes to bring out is that it is only in more recent years that dentists have learned to look upon the dental outfit as a whole, and to understand that an injury to or the loss of any part thereof must have its deleterious effect upon the stability, permanence, and efficiency of the organ of mastication.

The Arthur method of preventing approximal caries of the teeth was soon abandoned, because it was founded on a wrong principle, and the method of extracting molars and bicuspids for relieving the crowded conditions in cases of malocclusion has been given up, because this also has been proved to be wrong in principle in practically all cases.

With the means available today, the careful dentist will spare no time or effort to save every tooth, unless the depredations of caries and pyorrhea, due to neglect and delay, have rendered the salvation of the tooth an impossibility. Some sage has said: "To cure is the voice of the past, and to prevent is the divine whisper of the future."

DENTAL PROPHYLAXIS.

Dentistry has not been deaf to this divine whisper, and for many years men prominent in its ranks have urged the theory and practice of prevention upon their patients and upon their colleagues. The systematic application of prophylactic measures in private practice is common at the present time, and among the better class of dentists the man who does not look after his patients' welfare in this direction is the exception.

Scientific prophylaxis is a study in itself, and in the near future we shall not be surprised to see hundreds of men and women in our profession practicing this branch as a specialty.

The term prophylaxis as applied to dentistry is a broad one; it does not mean simply the cleaning of teeth. It includes that, but it also involves a careful observation of the mouth as a whole. It means a thorough understanding of normality and a quick observation of any departure therefrom; a speedy recognition of incipient inflammations, and an ability to clearly diagnose their causes; it includes the skill for promptly removing the cause, curing the abnormal process, and perpetuating a condition of health throughout the oral cavity.

The degree of interest shown in this work by the dental profession, as well as the interest shown in the subject of oral hygiene by the laity, indicates a keener appreciation of the possibilities of prevention than we have ever noticed in past decades.

DENTAL RADIOGRAPHY.

The constantly increasing use of radiography in the general practice of dentistry and its allied specialties is worthy of comment. It is no longer necessary for the dentist to grope aimlessly in the dark when diagnosing obscure conditions in the mouth and adjacent parts.

Dental radiographers who have made a special study of the use of the X ray as applied to dentistry can, in a large percentage of cases, produce a picture which will be of great assistance in locating obscure lesions. The uses of the radiograph in dentistry are too numerous to mention, but as an aid to root-canal work it has been invaluable, and it has been an important factor in developing a higher standard in this branch of our work.

Dr. Rhein has said that the day is not

far distant when all pulpless teeth will be radiographed two or three times during the progress of their treatment and filling. While this procedure may not necessarily have to be followed in all cases, it will certainly be of great value in a large percentage of cases, to those who care to take advantage of this diagnostic aid.

THE CAST GOLD INLAY.

The gold inlay and the casting of gold, as introduced by Dr. W. H. Taggart, constitute one of the greatest boons that has ever been bestowed upon the profession of dentistry. After five years of study, experimentation, and practical use of the cast gold inlay, the profession is convinced of the wisdom of Dr. Taggart's method of filling and building up badly broken-down teeth with cast restorations. In fact, the casting of gold has really revolutionized the practice of operative dentistry, and has shed its blessing not only upon the dentist, but also upon the patient.

The cast filling has also been an important factor in improving the standard of cavity preparation. Prior to its introduction, the temptation to save frail tooth structure was always present, because of the added time necessary to pack gold foil in cavities where thorough cutting was done. Now there is no longer any excuse for lack of thorough preparation, as it requires but little more time to set a large inlay than it does to set a small one.

Like all other methods of filling teeth, the cast gold inlay has suffered abuses, which in some cases may seem to have brought discredit upon the method, but as a matter of fact the discredit rested upon the operator who had set an ill-fitting and badly contoured inlay.

The fact that a filling is made of cast gold does not excuse an operator for neglecting to produce a good contact point. He is rather less excusable for this defect in an inlay than he was for a similar deficiency in an old-style foil filling, where it was even more difficult to obtain a good contact point. Furthermore, the fact that a gold restoration is large does not excuse the operator for failing to reproduce the anatomy of the lost parts. Too often we observe large masses of gold in molars in which no sulci or grooves or pits have been carved, and where the marginal ridge is entirely absent.

The perfect inlay not only fits its cavity margins faultlessly, and knuckles tightly at its contact point, but it also occludes properly with the tooth or teeth with which it comes in contact. When properly used, the gold inlay is almost unlimited in its application, and as a method of tooth-saving is of incalculable value to dentistry.

CAST PORCELAIN INLAYS.

Cast porcelain, which at one time seemed to be within our grasp and gave much promise, is still a will-o'-the-wisp. Those who are interested in the development of a system of casting porcelain inlays have proved that certain kinds of porcelain can be cast with a clean edge and excellent fit. Up to date, however, the porcelain has not proved reliable when submitted to the environment of the mouth, and we await further developments with much interest.

With the system of casting porcelain as already evolved, it simply remains for the experimenters to give to the profession a porcelain which is capable of being fused and cast and which will also have properties that will enable the material to withstand the chemical action of the fluids of the mouth.

Such a formula would have great value to the dentists who are interested in repairing and restoring carious teeth—for, up to date, no material has been introduced that can truly take the place of porcelain when the esthetic consideration is paramount.

SILICATE CEMENTS.

The optimistic prophecy concerning the silicate cements has not been fulfilled. Several different formulæ, coming under this general head, have been well advertised, largely sold, and widely used.

Silicate cement as a substitute for porcelain is an interesting, enticing, and disappointing proposition. It is interesting because a special technique is required for its proper mixing and manipulation, and this cannot be acquired without careful study and experimentation. It is enticing because of its translucence and perfect color effect when the correct shade of powder has been chosen, and because of the short time necessary for its insertion, as compared with the time required for making a porcelain inlay. It is disappointing primarily because of its unreliability—in other words, because of a lack of uniformity of the results gained from its use.

Even when the greatest precaution is used and the most careful manipulation is carried out, including the use of the rubber dam, two fillings in the same mouth, placed at the same sitting under identical conditions, will, at the end of two or three months, show marked differences in appearance.

These varying results are presumably due to the sensitive chemical nature of the material itself, and to the element of human error that must necessarily be present in the mixing and inserting of the fillings. Silicate cement is also disappointing because of its inherent physical weakness and lack of edge strength. These defects necessarily limit its use to cavities which are more or less sheltered, and in which the filling will not be directly subjected to the stress of mastication.

These conclusions have been reached after seeing silicate cement fillings in compound cavities in bicuspids and molars. The constant element of imperfection in all cases where such restorations of lost tooth structure have been made must necessarily lead to the decision that silicate cements are not adapted to general use as a filling material.

The locations where this material can be used with some certainty of satisfaction are simple cavities of small dimensions on exposed surfaces, and small cavities in approximal surfaces. To reduce the danger of discoloration, lining the cavity with zinc oxyphosphate cement is suggested, but even this does not insure certain results.

Occasional cases in which a silicate cement has been satisfactory, without change of color and without any noticeable change in the surface of the mass after two or three years, makes us hope all the more that we may in the near future master the mysteries of this material and obtain uniform results in its use.

(II.)

Scientific Development.

REPORTED BY DR. D. H. SQUIRES.

The record of the scientific principles which have been brought out during the past year or so is remarkable only for its scantiness. The dental profession is not making the progress that it should, because of the fact that investigation is left to a few already overworked men, who do not receive any material assistance from the profession in general.

KEEPING RECORDS OF OPERATIONS.

Dentistry can be raised to a much higher scientific plane through the keeping of accurate records of operations. Charts should be kept of both the hard and soft tissues of the mouth, noting the interdependence of these tissues before and after treatment. While practically all dentists record the operations which are performed upon the hard tissues of the mouth, few note the influence of tooth restoration upon the soft tissues. As much attention should be paid to the latter as to the former, because a profession can only grow and develop from what it really accomplishes. Who can tell whether the source of the beginnings of pyorrhea alveolaris was the lack of contact, too broad contact, or the improper placing of contact points in restoring approximal surfaces, unless accurate records are made of the cause and effect of such operations? Not much attention is given to the cause of the inflammation of the septal tissues. These conditions should be recorded, and the methods employed in their treatment tabulated.

Can we conceive of the progress which would be made, if accurate data were being recorded for future investigation? We should take pity on the few scientific men in our profession who sacrifice so much for us all. Instead of helping them, we publicly call them "shining lights," "great thinkers," "men of superhuman intelligence," and by assuming a worshipful attitude in their presence, believe that our duty is done. Such treatment is very distasteful to these men. They are human beings, active members of our profession, and seeing the great need for investigation of our present theories and methods of practice, they willingly sacrifice their energies in the hope of raising the intellectual plane of dentistry. Has it ever occurred to us that we could assist them, relieving them of the great burden of gathering statistics upon which to form a working basis, by keeping accurate data of the operations performed and the results obtained in our practices?

Empirical methods of practice will never be abolished until every member of the dental profession becomes an investigator to the extent of keeping accurate records.

RADIOGRAPHY.

The introduction of the radiograph into the practice of dentistry as a means of diagnosis is of great scientific value. It is indispensable, not only to the specialist but to the general practitioner as well. Much better results may be obtained, however, if the dentist directs the technique of the operation, because a person not educated along dental lines will not appreciate just what is desired in the field of operation.

Fracture of the jaws and the roots of teeth, antral diseases, impaction of teeth due to various causes, undeveloped roots of teeth, the determination of the number of root-canals, and faulty root-canal fillings, perforation of roots, and pulp-stones demand the radiographer's confirmation.

Many other uses of the radiograph are suggested to the general practitioner daily.

PYORRHEA ALVEOLARIS.

The instrumentation employed for the removal of tartar from the necks and surfaces of teeth has been more accurately performed during the past year, because the instruments suitable for this purpose have been constructed upon more definite and scientific principles. The scalers designed by Carr offer the following advantages: (1) The grouping of the different shapes and sizes of the instruments. (2) The angle and bevel of the blades. (3) The two-point contact of each instrument on the tooth while in use. Instruments of this construction make it possible for the operator to scale accurately and progressively the entire root surface of the tooth.

The administration of oxygen supersaturated with a volatile liquid antiseptic has been recommended by Dunlap. The mixture is applied to the pus pocket with a fine syringe point, which is held a short distance from the tissues. While indications point to a considerable value in this method, yet, on account of its very recent introduction, little can be said at present.

SALIVARY CALCULUS.

Black, in a most interesting paper entitled "The Beginnings of Pyorrhea Alveolaris," has given to the profession a new theory on the deposition of salivary calculus. He says, among other things, that the salts from which the concretions are formed are all derived originally from the blood, body juices, and tissues, and that all specimens are made up of numerous particles thrown out of solution by precipitation and united in a solid form by agglutination.

He says that it has not heretofore been generally recognized that a colloid precipitate or agglutinated substance must first be formed and deposited upon the teeth or other solid substances before there can be a lodgment of the calcium salts; then the precipitated particles lodge in this material. This agglutinated material is not dissolved in running water, hot or cold. It coagulates and becomes white like the cooked white of egg at or near 200° F. It is soft and greasy to the touch and slightly sticky, and when freshly deposited is perfectly transparent.

Black states further that he has become impressed with the idea that the deposition of calculus does not depend upon the presence of more or less calcium salts in the blood, body salts, body juices, and secretions, and that while it may vary within limits without being abnormal, the amount of calcium salts may become abnormally large or small, possibly in a given secretion, and yet not be a factor of consequence in the deposition of any of the oral calculi. This deposition will depend primarily on the formation of the agglutinating substance in which the precipitated particles are caught and held.

He also found that while the deposition of calculus was rapid and practically continuous, a saline cathartic would stop the deposit completely within a few hours. Generally this stoppage continues from one week to three or four weeks, when the deposition will be gradually resumed.

He also found that the deposition of calculus can be increased or decreased by diet, and in conducting experiments he could say definitely when a deposit would be formed upon the teeth. In conditions of overfeeding, Black says, it is probable that the cause for the deposition of tartar upon the teeth is associated closely with the formation of a larger amount of chyle than can be properly assimilated, and that this leads to errors in metabolism in which the agglutinating substance is formed and deposited from the secretions.

PORCELAIN INLAY.

Nies of Brooklyn has introduced a new method of making a porcelain inlay by which the cement line may be practically eliminated. After the cavity is prepared in the usual way, a wax of very high melting-point is used for taking the impression of the cavity. After the wax has been properly trimmed to represent the contour of the surface to be restored it is removed, and its internal surface is coated with a mixture of silicate of aluminum and free aluminum and lime, which, on treatment with phosphoric acid forms phosphate of lime and aluminum, imparting setting qualities to this mixture. These powders are mixed with the liquid on a glass slab to a thin workable consistence; then with a small brush the mixture is painted upon the internal surface of the wax. After this is set, it is placed near a source of heat and allowed to dry; then it is subjected to still greater heat, and the wax is burned out. After the matrix has been allowed to cool it is ready for use. The thinner this matrix is the more quickly the heat penetrates it and fuses the porcelain. The object of this porcelain matrix is to enable the operator to make an almost perfectly fitting inlay, because it does not warp, tear, or distort, has rigid walls, and occupies no part of the cavity space. It also reduces the shrinking of porcelain by holding it to the cavity walls.

For separating the porcelain matrix from the inlay, the surface of the inlay is covered with wax, placed in a bottle containing a cold, diluted solution of hydrochloric acid—one part hydrochloric acid in four parts of water—and left in this solution over night. This causes disintegration of the model, and frees the inlay from it. The inlay is then cleansed with small burs and brushes, dipped in a solution of Bonsip to remove any trace of foreign material from its surface, and is then ready for insertion.

(III.)

Oral Sepsis.

AS REPORTED BY DR. FRANCIS P. HAMLET.

From a casual scrutiny of the current year's literature it is evident that much is wrong with American dentists and American dental methods. While it may not seem advisable to mention criticism in this report, yet it is apparent to your committee that a discussion of this subject would not be out of place. The criticism in mind comes not only from other countries but from American dentists, who have caused us to flinch under the rebuke and put us in a reflective mood of deliberation.

What has been said, though not unkindly, has some semblance of truth, and convinces the serious and painstaking that a plain, unvarnished condemnation of our faults—standing out boldly—is excellent medicine for us to take, because it tones up our ambitions and resolutions, and sharpens our appetites for the imposing, the magnificent achievements that can be reached by American dentists.

The most severe censure came from an English physician, who seems to be a keen observer of dental methods, and apparently competent to judge dental work intelligently.

The most important criticism was that relating to the origin of oral sepsis, namely, "crown and bridge work," and the "treatment of teeth without pulps." It was pointed out clearly and unmistakably by Dr. Hunter that oral sepsis, resulting from careless construction and application of crowns and bridges, will induce septic conditions in the mouth which would greatly alarm a medical man if they were found in any other part of the body.

Serious systemic troubles and wasting diseases resulting from pathological conditions in the alimentary tract have been traced to oral sepsis, and primarily to faulty crowns and bridges and diseased pulpless teeth.

These facts, these charges, so humiliating, are contrary to our knowledge, viz, the scientific knowledge meted out in our dental schools. Is it, then, indifference? Are we evading our obligation to humanity? Let us be charitable and say it is unskilful and unpractical application of our knowledge. For the sake of American dentistry let us make a defense, not in words, but by skilful and painstaking application of what we *know* to be right and proper.

But our American dentists have criticized the profession for improper and unscientific filling of root-canals. They would increase our troubles, however, before we can correct the errors made, by advising us that it is not good practice to fill large cavities in vital teeth with any material, nor to put a gold crown over any tooth, without devitalizing and removing the pulp and all its fibers, and filling the canals carefully to the apical foramen.

If this is true, how about the usefulness and comfort, health and beauty, of numberless vital teeth that have been filled with large gold and alloy fillings, and have been doing excellent service for thirty and forty years. If disease of the teeth due to badly treated pulps is so prevalent, suppose we turn our attention to some way of conserving the pulp, and eliminate to a larger degree the troubles arising therefrom.

PYORRHEA ALVEOLARIS.

But oral sepsis can be traced to other serious causes, pyorrhea alveolaris being among those foremost to be dreaded.

There is still doubt, to the point of argument, among the pyorrhea specialists, as to the origin of this disease, some claiming that it is of local origin, others that constitutional causes are responsible. If systemic conditions are responsible, we have failed to provide a treatment that will arrest this suppurative process. When medical men fail to recognize the evil results of this disease to their own work, especially in the treatment of the throat, is it any wonder that the laity cannot realize the danger of pus pockets sending poison into the digestive system with every swallow?

We find hope in the practice of oral hygiene, which produces that healthy relationship of the functions of the mouth which is the mainstay of our existence. Healthy relations to all parts are to be found in the mouths of normally breathing persons, who, in consequence, evince great vitality and resistance to disease of all kinds. Proper breathing is the main foundation, and strongly appeals to the orthodontist in his labors toward producing normal relations of the teeth; it paves the way, not only to preventive dentistry, but also to the prevention of general diseases. Consequent on the work of the orthodontist and of the rhinologist, the respiratory apparatus performs its functions in an orderly and vigorous way, aiding the proper development of the maxillary bones, giving proper contour to the face, and dilating the nostrils for the natural intake of air.

THE DENTAL NURSE.

Dealing with oral sepsis resulting from pyorrhea or abscessed teeth requires the highest skill possible; will the trained dental nurse be equal to the requirements? Many practitioners contend that her proper work is at the chair, anticipating the needs and wishes of the operator, handing him the instruments, sterilizing, mixing cements, and assisting the dentist as the hospital nurse assists the surgeon. These are questions that attract attention at the present time.

There is much to be said in favor of the dental nurse, but we must not overlook the fact that the practice of oral prophylaxis, as it has been taught by our great men, requires judgment gained only by long years of labor on the dental organs.

Young women can acquire the skill to clean the teeth, but the requirements in a case of oral sepsis can only be appreciated by knowledge attained through experience.

CASTING FAILURES AND REMEDIES.

By C. S. VAN HORN, D.D.S., Bloomsburg, Pa.

(Read before the Reading Dental Society, Reading, Pa., February 1, 1912.)

IT may seem presumptuous upon the part of the writer to present a paper the title of which would indicate that success does not always attend our efforts in this new field of activity, viz, casting. But when he states that the main theme of the discussions which have followed four papers presented upon the same subject has invariably been a consideration of failures, and inquiries as to remedies; that the correspondence arising from those papers has without exception consisted in inquiries respecting the cause of and remedies for innumerable failures; and lastly, that any success which he has had in this new field is mainly attributable to the multiplicity of failures with which he has been confronted, his seeming presumption may and probably will be overlooked.

THERAPEUTIC WORTHLESSNESS OF AN IMPERFECT INLAY.

The phrase, "Anyone who can fill a cavity with wax and can fuse gold can make a cast gold inlay" is probably still ringing clearly and distinctly in many memories, because of its flagrant ambiguity. Conscientious intelligence never has nor ever will be duped into believing that an inlay presenting a broad line of unprotected, disintegrable material is dependable as a therapeutic agent. Neither does the consensus of intelligence, born of experience, permit the assumption that cast gold inlays, made for complicated cases, ever reach their marginal destination unless the pattern be properly and perfectly adapted and scientifically invested. For upon the manner in which pattern wax is manipulated and treated depends very largely the success or failure of the cast inlay when considered therapeutically.

As the writer has so recently covered the ground respecting the physical properties of pattern waxes,* failures from that source will not be considered here; it is well, however, to keep constantly in mind that important phase of the casting process.

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* See the author's papers on "Casting," DENTAL COSMOS, August 1910, p. 873; "Concerning Casting Methods and Casting Devices," *Ibid.*, June 1911, page 664; "Standardizing the Investing Process and Simplifying the Casting Process," *Ibid.*, October 1911, p. 1109.

IMPORTANCE OF PERFECT WAX PATTERN.

Probably the most potent cause of failure is an imperfect pattern. Undoubtedly every operator has experienced the extreme difficulty, by the ordinary technique, of making patterns for approximo-occlusal cavities extending far beneath the free margin of the gum tissue. Upon removing a beautifully contoured and polished pattern it is often discovered that the wax has not reached the cervical margin of the cavity. The remedy for failures of that nature, briefly stated, consists in carving wax forms that simulate in shape the finished pattern (or the cavity), having ample surplus for finishing and polishing.

Prior to receiving the invitation to read a paper at this meeting, I had been induced, by an insistent executive committee, to prepare a paper for the 1912 meeting of the Susquehanna Dental Association, to be held at Wilkes-Barre, in May. That paper, entitled "The Wax Pattern," will conclude the series on the "expanded pattern" technique, and will consider the various cavity conditions with which we are confronted, and methods of meeting them. This will require many illustrations of conditions, and the various steps in the pattern making. Unfortunately these exhibits are only fairly well started, so that at this time we can consider but an example or two, which it is hoped will suffice to demonstrate the use and range of the technique, and help the operator over at least some of the difficulties until the time when he will be in full possession of the complete technique.

SOURCES OF FAILURE IN MAKING WAX PATTERN.

Improper removal of pattern from cavity. A failure may be caused by improperly removing the pattern from the cavity. Of course, it is assumed that *non-plastic* pattern wax is used for all patterns in the mouth, and in no instance does non-plastic pattern wax require chilling by cold water prior to its removal from the cavity. Heating a sprue wire or other metal instrument of considerable bulk, and embedding it in the pattern while it is in the cavity, is a dangerous practice, for the reason that the hot metal renders the wax plastic throughout a considerable area, and it is next to impossible to hold the sprue wire stationary during the time the wax is regaining its original rigidity; hence the pattern is very liable to become bent. If the cavity be approximo-occlusal, the heated sprue would be embedded at or near that part of the pattern which represents the marginal ridge of the tooth. If, while the wax (which has been made more or less plastic) is hardening, the sprue is moved mesially, or forced more deeply into the wax, it is not at all unlikely that the pattern will be distorted, and when the casting is placed in the cavity it will "rock," owing to the occlusal extension, or step part of the pattern, having been bent away from the floor of the step, or the approximal portion having been forced mesially, or a combination of both these movements.

In removing any and all inlay patterns, the writer has never found occasion to use any other instrument than an S. S. W. No. 6 explorer, this explorer being very carefully thrust *cold* into the pattern at the most convenient point, and the pattern being gently coaxed out, care being exercised to avoid marring the edges which represent the buccal and lingual wall margins of the cavity. The sprue, which is made from No. 13 gage, 0.072 inch German silver wire, is heated and embedded firmly in the pattern while the latter is either lying in the palm of the hand or held very gently between the thumb and finger.

Distortion of wax pattern in taking the bite, and a remedy. Another and very common source of failure arises in making patterns for those cases in which the approximating tooth is missing, the pattern "mushing" out when the teeth are brought into normal occlusion. To obviate this trouble, in those cases in which the cavity is extensive an auxiliary matrix must be used. The writer has employed with a great deal of satisfaction, in a large number of such cases, a very simple contrivance: A strip of No. 36 gage planished copper of proper width and length is slit to the center on opposite sides and ends, the slits being about 1/16 inch or more from the ends of the strip. The strip is locked together by slipping one slit into the other and pressing down so that the band is even at its edges, thus causing the slit sides to engage the uncut sides of the strip and forming a lock that will not give way unless sufficient force be applied to tear the metal.

No difference what form of matrix be used for these cases, it should be adjusted loosely enough to permit an ample surplus of wax at the margins for final finishing after the matrix is removed. If, however, a discrepancy at a readily accessible margin does appear when the matrix is removed, it can occasionally be obliterated by melting a small piece of pattern wax, flowing it in the crack, and pressing home, the pattern having been previously dried and being held firmly in position in the cavity. After doing this, it is well to move the pattern very slightly toward the line of draft, to make sure that the added wax is not sticking to the tooth, which is not liable to happen unless the *tooth* has been too thoroughly dried.

WAX PATTERN IN APPROXIMO-OCCLUSAL CAVITIES.

In making patterns in approximo-occlusal cavities where the approximating root is to be crowned, a failure can easily be averted by first constructing the crown, and, after placing—*not cementing*—the crown in position on the root, proceeding with the pattern-making. Another condition of the same type is presented by two approximating cavities facing each other, as a mesial cavity in a first molar and a distal cavity in a second bicuspid. Attempting to make patterns for both cavities by stuffing them full of wax, and subsequently separating by sawing or other means, usually spells failure. A more rational method consists in first filling one of the cavities with temporary stopping, and then proceeding with the pattern-making, thus in effect forming a fourth wall to the cavity, as is the case with the crown. Of course it is to be clearly understood that the cases under consideration are of the type in which an auxiliary matrix is not indicated, being cavities which would be easily taken care of if the missing tooth structure indicated were present. We simply supply, so to speak, the missing tooth structure, with the advantage, in the case of either the crown or temporary stopping, that it can be removed prior to finishing the approximal portion of the pattern.

It should be noted that we tacitly express this important principle: *In all pattern-making, have every cavity condition favoring a condensation of the pattern wax!*

FAILURES DUE TO OVERHANGING MARGIN IN WAX PATTERN.

Failures are liable to arise from the very bad practice of leaving an overhanging margin on the pattern, the overhanging portion concealing the true relationship existing between the margin of the pattern and the corresponding margin of the cavity. If for some reason the wax be not perfectly adapted at the margins, this discrepancy is not visible until after the casting is cemented in the cavity and the overhanging portion of the inlay ground away. The remedy for this is quite self-suggestive: Finish every pattern just as though it were to be the permanent final inlay.

IMPROPER INSERTION OF SPRUE WIRE.

Partial failure may arise from improperly locating the sprue wire. Whenever possible, the sprue should be attached at a point farthest away from any vulnerable margins of the cavity, thus bringing the corresponding margins of the inlay to the bottom of the mold. The reason for this is that the bottom of the mold is the first to fill, and, in very large castings especially, the part of the mold first filled is the sharpest part of the casting.

SUGGESTION FOR MAKING CAST COPES FOR ALL-PORCELAIN CROWNS.

In making cast copes for so-called all-porcelain crowns, the failure of the pattern wax to stick to the metal post can be largely remedied by heating the post and touching it to the edge of a sheet of pink "base-plate" wax, thus forming a film of the base-plate wax on that part of the post that will be surrounded by pattern wax when it is melted in position on the cervical end of the crown—the crown, of course, having previously been oiled. Base-plate wax adheres more tenaciously to the metal post than non-plastic pattern wax—hence this suggestion.

INVESTMENTS AND INVESTING.

Considering failures in their regular sequence, we come next to investing and investments. Right here it is well to clarify an ambiguous statement that appeared in my last paper on casting—"Standardizing the Investing Process and Simplifying the Casting Process" (DENTAL COSMOS, vol. liii, 1911, p. 1109.) This statement there appears (page 1114): "Nodules or small eminences on the casting are caused, not, as is generally believed, by air-bubbles that are supposed to be contained in the investment which is poured into the flask, but rather by trapping air between the investment and the pattern when the latter is being coated." At the time when that statement was made, the writer was not familiar with investing materials which contain *graphite.*

Untoward effects of graphite in investments. Graphite, in the investments which have come to our notice, causes what may, for want of a better term, be called, the "gas stage." As to its cause, the writer is not positively certain, but suspects that as graphite is highly porous, its air content, owing to the smallness of the pores, is slowly—"grudgingly"—liberated when coming in contact with water. Hence these graphite investments place the operator in the very annoying condition, to use a homely though significant phrase, of being between "a sweat and a stew," until the casting is removed from the investment—when, more often than not, we find nodules which have been caused, not by trapping air, but rather by this so-called "gas stage." We have retarded the setting of graphite investments for three hours, yet upon being agitated or spread upon a glass slab with a spatula or a brush, numerous minute air-bubbles have manifested themselves. The only remedy we can suggest at this time is: Use an investing material that does not contain graphite, if nodules are to be prevented with any degree of certainty.

Causes of cracking of investments. Cracked investments are the source of many failures, and arise from several causes. Inferior material, starting the drying-out process before the investing material has hardened sufficiently, drying out too rapidly, heating up too rapidly, and excessive force applied in casting, are the most common sources of this trouble. As the remedies stand out in bold relief, we shall pass to the next stage in the process—casting.

CAUSES OF FAILURES IN CASTING.

Assuming every other step in the process to have been executed perfectly, the actual casting is the simplest part of the whole procedure. But even so, failures creep in, and the writer is disposed to attribute most of them to three causes: Crude casting machines; underfused gold, meaning gold which is not at the proper state of fluidity; and too much force exerted upon the gold when it is forced into the mold.

Underfusing of gold. The writer surmises that the majority of operators who practice casting do not heat the gold to the proper state of fluidity. Whether this is due to a fear of overfusing it, or to an anxiety to do the casting, he does not pretend to decide; but he would suggest that, if an operator does not obtain sharp castings, he should make a very strenuous effort to volatilize the gold. He should get it as hot as he thinks it should be, then get it hotter, and when it is hotter, keep on getting it still hotter, and lastly, try his best to *burn it up.* This will not occur, but he will produce the most beautiful casting that he has yet produced. With an ordinary gas blowpipe it is impossible to volatilize 24-karat gold.

Impurity and insufficient amount of gold. Other failures in casting may be attributable to "dirty" gold, sluggish gold, gold of unknown karat, scrap gold, or an insufficient surplus remaining in the crucible after the mold has been filled with the fluid metal. Dirty gold is inexcusable. Sluggish gold is the result of repeated fusing and contamination from contact with the investing material. Dr. Taggart made the excellent suggestion of refining the gold by what is known as the dry process. This consists in fusing the gold and, while it is fluid, sprinkling it with powdered borax and saltpeter, equal parts. This is an excellent and efficient method of treating gold that has not become too sluggish from long use—when it should be sent to a refinery.

The writer insists upon the use of 24-karat gold for all inlays, and employs it exclusively, even for inlays that are to be used as supports for small bridges, when, if the case demands, the inlay is reinforced with iridio-platinum bars in much the same manner as iron and steel are used for reinforcing concrete structures. If much resistance to abrasion from mastication is desirable, a gold-platinum alloy may be indicated, but here, again, we prefer, whenever possible, iridio-platinum bars placed so that they take up the wear and tear, leaving the *margins* of the inlay susceptible to burnishing. In other words, the "working" part of the inlay is made of iridio-platinum, the part of the vulnerable margins of the cavity of 24-karat gold.

The last failure mentioned above is remedied by having at least 5 dwt. of gold remaining in the crucible after the mold is filled.

CLEANING THE CAST INLAY.

After the casting is made and removed from the investment, a failure may creep in, if the investment material is not removed with absolute thoroughness from the cavity surface of the casting. When superheated gold is forced into the mold the investing material has a tendency to "burn fast" to the gold, with the result that it is next to impossible to remove this closely adhering film by any ordinary means. Every casting, therefore, should receive a bath in hydrofluoric acid; after which it should be boiled in water and again thoroughly scrubbed. We then know that, if the casting does not "seat" perfectly, and as a result shows a space at the margins, this is not caused by an overlooked particle of investment still adhering to the cavity surface of the inlay; and thus we look for another cause of failure, *i.e.* nodules on the cavity surface of the casting.

NODULES.

Everyone who has read the paper above referred to, is familiar with the author's opinion respecting *nodules.* Yet, even though he may fully agree with the theory and religiously practice the method outlined in that paper, it does not follow that his castings will be absolutely immune to nodules. By just the merest slip, or by overlooking an air-pocket, a nodule may result, which naturally will be located in some nook or corner where it is not readily perceptible with the naked eye. Therefore, all inlays, no matter how perfect and beautifully sharp they may appear to the naked eye, should be very carefully inspected under a magnifying glass.

We have endeavored to touch most of the essential features, but it is realized that there are other points, other failures and other remedies that may have occured to the reader, possibly through suggestion, or perhaps through circumstances that have been impressed deeply upon his memory. Casting, though a husky youngster, is yet in its swaddling-clothes, and will require unselfish endeavors and combined efforts to assist it on the way to speedy and healthy maturity.

NITROUS OXID AND OXYGEN AS A GENERAL ANESTHETIC, AND ITS USE IN DENTISTRY.

By CHARLES K. TETER, D.D.S.,
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(Read before the Connecticut State Dental Association at Bridgeport, April 16, 1912.)

IT is a lamentable fact that the important subject of the administration of anesthetics is sadly neglected in many of our medical and dental colleges, and that students are allowed to graduate knowing absolutely nothing concerning general anesthetics and their administration. In some of our dental schools a better course of instruction in this subject is given than in many of the medical colleges, the students not only being given a number of lectures, but being required to administer some general anesthetic, under the supervision of a competent instructor. The average dental student, therefore, is as competent and as well qualified legally to administer a general anesthetic as is the average graduate in medicine. More efficient instruction in this subject for both dental and medical students, however, is an urgent need.

The part played by dentists in the discovery and development of general anesthesia is a matter of historical record familiar to all. Wells and Morton, both epoch-makers, were dentists. It is to be expected, from the extremely painful nature of much of their work, that members of the dental profession should be especially active in the perfecting of agents and methods for the induction of general anesthesia. It is gratifying, therefore, to observe the interest which they are manifesting in the use of nitrous oxid and oxygen for this purpose.

The marked improvements which have been made within the past ten years in the technique of administering nitrous oxid and oxygen have brought this mixture into great demand as a general anesthetic for dental and general surgery. This has opened up a much wider field than formerly existed for the professional anesthetist, because of the fact that considerably more skill is necessary in the administration of nitrous oxid and oxygen for general surgery than is necessary in giving other general anesthetics. With ether and chloroform even the most unskilful anesthetist can manage to keep the patient sufficiently quiet for the surgeon to operate, though the patient may not recover for hours from the effects of the anesthetic. It is to be hoped, for the good of the public and for the dignity of the profession, that surgeons will soon come to recognize the advisability of calling upon the professional anesthetist whenever a general anesthetic is indicated.

There are many reasons for the attention which the mixture of nitrous oxid and oxygen is attracting at the present time in the dental and medical professions, the chief one of which is that nitrous oxid and oxygen, under certain conditions, will induce general anesthesia with the least possible interference with the elements composing the human body and with their functional integrity.

PHYSIOLOGICAL ACTION OF NITROUS OXID AND OXYGEN.

We will now consider the effects of nitrous oxid and oxygen upon the organism.

The gas, on entering the lungs, is distributed throughout the alveoli and is taken up by the blood. Just how nitrous oxid is taken up by the blood is not definitely known as yet. There is no positive evidence that it forms any combination with hematin or any other substance within the blood, but it is highly probable that it does. Davy's experiments(¹) proved that nitrous oxid has the power of turning out oxygen or air from water, and it is probable that in addition to its preventing the access of fresh oxygen to venous blood, it actually dislodges more or less completely that oxygen which still remains in it when it reaches the pulmonary capillaries. It is possible that nitrous oxid forms a dissociable compound with hemoglobin, and that it may form a similar compound with the protein of the plasma in the same manner as carbon dioxid does, according to Bohr(²). In any event we know that nitrous oxid is readily taken up by the blood.

Paul Bert claims that 100 volumes of blood at body temperature will absorb 45 volumes of nitrous oxid. Hermann(³) found that 100 volumes of blood will absorb somewhat less than 60 volumes of nitrous oxid, but Bert's figures are probably more nearly correct.

When blood saturated with nitrous oxid comes into contact with the delicate nerve cells, an action is brought about that causes a temporary cessation of their functional integrity.

Just how the cessation of the function of the nerve cells is brought about is not definitely known, but presumably general anesthesia is induced by some change of a physico-chemical character within the protoplasm of the nerve cell. Future experimental research may lead to the conclusion that general anesthetics produce their characteristic effect by limiting the normal processes of oxidation, upon which the intellectual, sensory, and motor centers depend for the execution of their respective functions.

Meyer(⁴) says:

> The anesthetic agent enters into a loose physico-chemical combination with the vitally important liquids of the cell, perhaps with the lecithin, and in so doing changes their normal relationship to the other cell constituents, through which an inhibition of the entire cell chemism results. It also becomes evident that the narcosis immediately disappears as soon as the loose reversible combination dependent on the solution tension breaks up.

The rate of absorption of nitrous oxid and oxygen depends on numerous conditions, *i.e.* temperature of the gas, temperature of the blood, pressure of the gas, rate and depth of respiration, and rate of capillary flow through the walls of the alveoli. The elimination of nitrous oxid and oxygen takes place principally through the pulmonary blood-stream and respiratory tract. On the withdrawal of the anesthetic, the alveolar tension falls below the blood tension, and elimination commences. If good respiration and circulation are present on the withdrawal of nitrous oxid and oxygen, recovery takes place in a very few minutes. The patient will show symptoms of recovery within sixty seconds after a profound anesthesia which may have lasted two hours, and will be conscious within from one to three minutes. At times, when poor circulation and respiration are present, recovery will be much slower, and if much surgical shock has been produced, recovery will be still slower.

It is an excellent plan to ventilate the lungs well after any general anesthetic by washing out with a few breaths of pure oxygen, this procedure to be repeated a number of times, allowing a few breaths of air between.

EFFECT OF NITROUS OXID ON THE BRAIN.

I have reported in former papers(⁶) a number of cases of brain surgery, and the effect of nitrous oxid on the brain. It may not be amiss in this connection to refer to the subject again.

It is interesting and very instructive to observe the effect of nitrous oxid on the brain, also the effect of the oxygen. I have observed that when the patient inhales pure nitrous oxid, the brain begins to lose its natural pinkish color in a very few seconds. If the inhalation is continued without air or oxygen, the brain continues to become darker. If this is continued to the third stage of anesthesia, the brain will have the appearance of stagnant blood and will be greatly dilated. The dilatation is concomitant with the discoloration, and if there is much cyanosis, the brain will be greatly discolored, and will protrude through the opening in the skull.

All of the brain operations which I have attended have shown that if the anesthesia is accompanied by cyanosis the brain will not only be dark in color, but dilated as well. Consequently I affirm that the dilatation and congestion were not due, *per se,* to the anesthetic action of nitrous oxid, but constitute an entirely asphyxial manifestation. The asphyxial factor may enter into any anesthesia, and if it does, the afore-mentioned phenomena will be present, no matter whether the anesthetic agent employed be chloroform, ether, or nitrous oxid. They are more apt to accompany nitrous oxid than any of the other anesthetic agents, owing to the fact that nitrous oxid must be administered from 80 to 95 per cent. pure. The asphyxiation produced in nitrous oxid anesthesia is not dangerous, however, as compared with that produced by ether or chloroform. In brain surgery, nitrous oxid alone, or administered with air, is not a good anesthetic; but nitrous oxid with varying proportions of oxygen, keeping a good color, is without question a good and safe anesthetic even in brain surgery.

EXPERIMENTAL RESEARCH.

Dr. Fenton B. Turck of Chicago, Ill., some years ago, carried out a series of experiments with reference to the use of chloroform and ether on animals, with a view to determining the changes that take place in the blood during anesthesia. It was found by these experiments that there was a loss in the anti-bodies or ferments of the blood, and that there was a diminished resistance to the bacteria, such as agglutination of the precipitins and other substances which he found in the anti-bodies in the blood. It was found that these animals went into collapse, and that shock is induced very early in animals that have a lowered condition of the blood; also that there is a marked diminution in the anti-bodies, the ferments, the precipitins, and other substances. Dr. Turck carried on a number of experiments demonstrating these changes, also showing the effect of ether and chloroform on the serum itself. He concluded from these experiments that there were two conditions met with—one, that ether and chloroform had an actual direct chemical effect on the serum; the other, that biological changes took place and acted on the cells as a toxin. When he used nitrous oxid anesthesia, none of these chemical changes took place.

Dr. Graham of Chicago in his experiments has shown that ether affects phagocytosis, thereby lowering the immunity of the patient from shock and infection. Nitrous oxid does not affect the phagocytic action of the blood, so that a patient anesthetized with nitrous oxid has a higher immunity from shock and infection than has a patient to whom ether has been administered.

Dr. George W. Crile of Cleveland has carried out experimental and clinical researches comparing nitrous oxid and ether anesthesia. He says:

> The changes in the ganglion cells of the central nervous system from the cortex to the cord, as indicated by the newer pathology of cytology methods, show a distinct difference between the cells in the ether and nitrous oxid animals. The cells of the nitrous oxid animals showed much less change than in the ether dogs. . . . There is apparently no post-anesthetic effect upon either the lungs or the kidneys, nor indeed upon any other part of the body. . . . Then, too, in infections, since using nitrous oxid as contrasted with ether, we are equally certain that ether as compared with nitrous oxid impairs the immunity of the patient. . . . There is unmistakably a great diminution in surgical shock. Indeed, the immunity from shock is as striking in the clinic as in the laboratory.

From my clinical experience I can say that nitrous oxid causes no degenerative changes in the cells of the body, and that it produces no permanent harmful results in any organ of the body. This is not the case if the anesthetist employs improper technique of administration, such as inducing and maintaining a marked degree of cyanosis, allowing an excess amount of rebreathing, and administering cold or impure gases.

CLINICAL EXPERIENCE.

I have been administering nitrous oxid and oxygen since June 1899. I used it exclusively for four years as the anesthetic for extracting teeth, and then was called upon to administer it for minor operations first, and for the removal of tonsils and adenoids. In this connection I may say that I have found, after thirteen years of experience, that the most difficult cases to manipulate in administering anesthetics are those for the complete removal of the tonsils. I shall have more to say about these special cases later.

On April 1, 1904, I located in Cleveland and took up the practice of administering anesthetics for surgeons, doing this work in the forenoons and devoting my afternoons to the practice of minor oral surgery and the extracting of teeth. In May 1908, I was appointed chief anesthetist to St. Luke's Hospital, and at once installed a plant for the manufacture of nitrous oxid. Two years later I installed another plant for the manufacture of nitrous oxid in Lakeside Hospital. There are no two other hospitals in this country that have used nitrous oxid and oxygen as the anesthetic in general surgery to the same extent as it has been and is being used in Cleveland. I have administered this anesthetic 7576 times for general surgical work, and 13,547 times(5) for the extraction of teeth and oral surgery, making 21,123 administrations in all.

The duration of these anesthesias are tabulated as follows:

May 1, 1904—January 1, 1911.

General surgical cases, lasting—		
10 minutes or less	3,501	
15 "	1,217	
30 "	869	
1 hour	346	
2 hours	228	
3 "	22	
4 "	2	
		6,185
Extracting teeth—		
5 minutes or less	9,385	
Minor oral operations—		
15 minutes or more	2,148	
		11,533
		17,718

January 1, 1911—March 21, 1912.

General surgical cases, lasting—		
15 minutes or less	728	
30 "	127	
1 hour	116	
1 hour 30 min.	52	
2 hours	34	
2 " 15 min.	8	
2 " 30 "	3	
		1,068
Extracting teeth—		
5 minutes	2,014	
Minor oral operations—		
15 minutes or more	323	
		2,337

General surgery	7,253	cases
Oral operations and extracting teeth	13,870	"
Total	21,123	"

CASES SHOWING CONTRA-INDICATIONS AND POINTS OF SPECIAL INTEREST.

In this vast number of administrations I have met with only one death, which I reported in a paper read before the Odontological Section of the American Medical Association held at Atlantic City, June 1909, and printed in the *Journal of the American Medical Association,* August 7, 1909, and which is reported again to emphasize that the method has its contra-indications:

Case 1. Patient, Mrs. M., sixty years of age, had been vomiting for a month, and was in an exhausted and emaciated condition from starvation. The cause of her trouble was very obscure, and symptoms were lacking. Gall-stones were finally diagnosed. Owing to her extremely exhausted condition, an operation was considered hazardous, but imperative. The persons interested were aware of the likelihood of a fatal termination, so were prepared in a way for what followed. I found a weak, thready, irregular pulse running at the rate of 150, and hardly perceptible in the radial artery.

The anesthetic was started with 95 parts nitrous oxid and 5 parts oxygen. The oxygen was increased rapidly up to 10 parts. The patient was found to be fully anesthetized after she had taken about eight inhalations. It was necessary to increase the oxygen to 20 parts or more to prevent too deep anesthesia. There was a peculiar livid appearance in the face, but there was no cyanosis or any indication of anoxemia. After the patient was anesthetized, respirations were unhampered and regular, the pulse was about as rapid as at the beginning, but was of better tension and more regular.

The operation was begun within two minutes. There was no noticeable alteration in either respiration or circulation when the incision was made. The corneal reflex was abolished from the time anesthesia was noted to be present. It was necessary to increase the oxygen and diminish the nitrous oxid greatly, to prevent an overdose of the anesthetic. By the continued application of the phonendoscope, the heart was found to be acting fairly well. Everything was going along nicely until work was begun in the cystic duct and gall bladder; then respiration became uneven and forced, and the heart sounds were barely discernible. The operation had been in progress for fifty-five minutes. No cyanosis was present in the face and oxygenation seemed to be perfect, but it was noticed that the fingers of the patient were blue. This blueness gradually crept up the hands and arms, and as a large increase of oxygen and the discontinuance of the nitrous oxid did not remedy the condition, we at once used pure oxygen, atropin, and strychnin, but with no results, as the pulse and respiration gradually ceased. Artificial respiration and lung inflation with pure oxygen and other resuscitating measures were carried out for forty minutes, without a sign of reanimation.

This death, in my opinion, was due to shock and primary cardiac failure. The anesthetic was blamable only in so far as it added its influence in bringing about a lower resistance of the organism.

I know personally of twelve fatalities that have occurred while the patients were under nitrous oxid and oxygen. To be more exact, some of these twelve patients were breathing nitrous oxid, oxygen, and ether. Just how much blame can be attributed to the anesthetic it is impossible to determine, for most of the cases I know of were inoperable cases to begin with. In one case, death was due to the recklessness of a totally inexperienced administrator. If I should ever be so unfortunate as to be compelled to undergo a major operation, and cannot obtain the services of an anesthetist expert in nitrous oxid and oxygen, I should rather take my chances with ether administered by such an inexperienced man.

I will mention a few cases which I have had in my practice in order to bring out some points of special interest, such as duration of narcosis, extreme age, and physical condition of the patient.

Duration of narcosis. As to duration of narcosis, I have the following cases to report:

Case 2. The patient, Mrs. S., was sixty-eight years of age, very nervous, somewhat emaciated; valvular insufficiency; compensation fairly good.

The operation was amputation of the left breast for carcinoma with glandular involvement extending deep into the axillary space.

Anesthesia was induced in two minutes; some reflex effect on respiration was noted when incision was made, but no other movement of the patient. Profound anesthesia was easily maintained with about 88 parts of nitrous oxid and 12 parts of oxygen. This amount varied somewhat, but was about the average. Anesthesia was maintained without one breath of air or other anesthetic. The pulse at the beginning was 98; at the close, just before the anesthetic was discontinued, 112. The general condition was good under the circumstances.

Consciousness was regained within two minutes. The length of the operation was four hours and eight minutes.

As to the length of time that nitrous oxid and oxygen can be continued with safety, I know that this anesthetic can be given longer and with less danger than any of the other general anesthetics, excepting none.

Age of patient. In looking over my cases I find one which I have reported before(⁶). It is that of the youngest person to whom I have ever administered nitrous oxid and oxygen.

Case 3. A baby boy of three months whose birth had been induced at the eighth month was to be operated on for circumcision and amputation of toe.

No inhaler was used in this case, but instead, I forced the nitrous oxid and oxygen through the tube, holding it in front of the patient's mouth. Narcosis was induced in about forty seconds, with a mixture of about 5 parts of oxygen and 95 parts of nitrous oxid. A certain amount of adulteration was caused by the non-exclusion of the air, but, notwithstanding this, it was soon necessary to increase the percentage of oxygen in order to prevent muscular jactitation and clonic spasms. Perfect anesthesia was maintained to the completion of the operation, about thirty minutes. On the removal of the attenuated vapor, recovery took place in about forty seconds. The child seemed as bright as ever, and the sympathetic mother, in her anxiety, put the child to her breast at once, and nursed it without ill effects.

I have administered nitrous oxid and oxygen to over 5000 children, principally for removal of tonsils and adenoids and for dental extractions.

Case 4. Mr. J., eighty-seven years of age, extensive arterio-sclerosis; valvular insufficiency, and a general degenerative process extensively manifested.

The operation was for removal of stones from the bladder, of which over 200 were found.

The patient was very ill, having been in a comatose condition for over ten hours. No morphin or other narcotic was given. Nitrous oxid with about 15 per cent. of oxygen, varied as symptoms indicated, produced a beautiful narcosis, which was maintained for fifty-five minutes. Upon the withdrawal of the nitrous oxid the patient fully recovered from the effect of the anesthetic in about eight minutes. Consciousness was not re-established, however, until eighteen hours afterward. There was no nausea or other post-anesthetic complications. The patient withstood the shock of the operation remarkably well, and is living today.

The aged, as a rule, are good subjects for nitrous oxid and oxygen anesthesia, and take it nicely. It is necessary to keep close watch on all symptoms to prevent excessive blood pressure, and to keep a good florid color. The effect of the anesthetic is manifested very rapidly in aged patients. I have administered this anesthetic to a great many old people, some presenting practically no abnormality except that which is to be expected in the aged, but I have had others in which an extensive degenerative process of an active and chronic nature was manifested. In such cases, as a rule, I have been able to obtain satisfactory anesthesia with nitrous oxid and pure oxygen, and have had no cause for worry. There are exceptions to this, however, and I have had my resources taxed to their utmost. It is imperative that extreme cyanosis should never be produced in these cases, on account of the enormously increased venous congestion and dilatation of the brain which accompanies the extreme cyanotic condition. The condition of the walls of the bloodvessels in old patients is such, as a rule, that they will not stand a large increase in blood pressure, which may accompany anoxemia.

FUNDAMENTAL PRINCIPLES INVOLVED IN THE ADMINISTRATION OF NITROUS OXID AND OXYGEN.

I shall endeavor to explain the method of administering nitrous oxid and oxygen which has enabled me to obtain the best results. The following principles have been worked out: First, and most important, a continuous and even flow of both nitrous oxid and oxygen; second, warm gases; third, rebreathing the gases; and fourth, positive interpulmonary pressure.

Even and constant flow of the gases. To assure an even and constant flow of both gases, the nitrous oxid and oxygen should be under a constant and even pressure. There are two methods of having nitrous oxid under a constant and even pressure. The first is to use the gas from cylinders which have regulators and gages attached to them. These tanks are attached to the apparatus, and the gas will flow from them in an even and constant stream. The other method consists of a plant for manufacturing the nitrous oxid in the hospital or office. The gas is compressed into a large storage tank, holding from 800 to 3500 gallons. A gas regulator keeps the required pressure of the gas in the pipes leading to the operating rooms, and assures a constant permanent supply, which can be regulated accurately by the administrator. Since adopting this method, I have been able to produce far better results than ever before. It greatly simplifies the administration of this anesthetic and brings the cost of nitrous oxid to about sixty cents per 100 gallons. The cost of nitrous oxid purchased in large cylinders is about two-thirds of the price of that in small cylinders. The cost of the oxygen purchased in large cylinders is about one-half the price of that in small cylinders.

I have installed plants in my office, St. Luke's and Lakeside Hospitals, and know their efficiency. Quite a number of practitioners have seen my plants, and have had them installed in offices and hospitals.

The oxygen is not liquefied in the cylinders in which it is received; therefore we can obtain a positive, even flow of this gas from these cylinders. Oxygen is not manufactured with the same ease and safety as nitrous oxid; since, however, much less of it is used, there is less reason for a plant for its manufacture.

Having the gases so that an even flow can be obtained, it is a comparatively simple matter to induce and maintain an even narcosis. The nitrous oxid is allowed to flow all the time, the amount needed depending upon the type of patient; but when the amount is being used that produces the desired result in each individual case, only a very little alteration will be necessary throughout the entire operation. There should be a small stream of oxygen flowing all the time—from 10 to 14 per cent.—as well as one of nitrous oxid, but the smallest variation in the flow of the oxygen will control the narcosis. An even or an uneven anesthetic state will be produced by an even or an uneven flow of the oxygen. In fact, the effect of an anesthesia produced by nitrous oxid and oxygen will depend upon the accurate adjustment of the flow of the oxygen.

Warm gases. It is an established fact that all anesthetics are rendered safer if they are administered warm. Dr. Gwathmey was the first to experiment upon animals with warm nitrous oxid and oxygen, and he published the result of his experiments in a paper on "Warm *versus* Cold Anesthetics," read before the Medical Society of the Borough of the Bronx, New York city, October 9, 1907.

He found that the warm nitrous oxid and oxygen are at least over twice as safe as gases given at their normal temperature, and from three to five times as safe as cold gases; also that all anesthetics heated to the temperature of the body are safer, without any decrease in their anesthetic effects.

From my clinical experience I have found not only that Gwathmey's laboratory results are a fact in regard to making nitrous oxid and oxygen a safer anesthetic, but that far more profound anesthesia can be obtained by warm gases.

Anesthesia is induced much more quickly, and without excitement. There is, indeed, a great difference in the narcoses as produced by warm and by cold nitrous oxid. The warm nitrous oxid is taken up by the blood more rapidly and in larger quantities than is the cold nitrous oxid. Anyone doubting this fact should compare the results on the same patient by administering the gas cold and warm during a prolonged operation, and he will not need to experiment upon dogs to confirm this statement.

I have found that the best temperature for inhalation is about 90° F. The gas should be of this temperature when it reaches the patient. In addition to the advantages just indicated, all irritation of the bronchi or lungs is eliminated. I have administered this anesthetic warm a number of times for major operations to patients suffering from pneumonia, without any injurious effects. In fact, in three of these cases unmistakable improvements were noted in the condition of the lungs of the patients, due, no doubt, to the breathing of warm gases. I am anxious to try the experiment on a number of pneumonia cases in order to see what the result would be if oxygen were administered warm in the treatment of this disease.

Rebreathing. I have been applying the principle of rebreathing nitrous oxid gas on account of the great saving of the amount of gas required in maintaining prolonged narcosis.

The rebreathing of air or gases for any length of time has been considered by a great many to be a dangerous practice, because of the increased percentage of carbon dioxid and the probability of the presence of certain volatile organic poisons in the expired air.

In regard to the exhalations containing any organic poisons, Hermann(7) has shown in his experiments that no volatile poisons are given off by respiration. Haddam and Torrain Smith, in an investigation of this subject, have not only confirmed Hermann's work, but have extended it. Their conclusions on the subject are as follows:

> (1) The immediate dangers from breathing air highly vitiated by respiration arise entirely from excess of carbon dioxid and deficiency of oxygen, and not from any special poison.
>
> (2) The hyperpnea is due to the excess of CO_2, and is not appreciably affected by the corresponding deficiency of oxygen. The hyperpnea begins to appear when the carbon dioxid rises to about 3 or 4 per cent. At about 10 per cent. there is extreme distress.

If the above conclusions are correct, there is no reason why rebreathing of nitrous oxid and oxygen should not be employed, if the percentage of carbon dioxid does not exceed 4 or 5 per cent.

Since 1907 I have used the rebreathing of nitrous oxid and oxygen in all anesthesias for general surgical cases, and have not found a single case where any serious results were produced. As I have stated before, the reason for utilizing the method of rebreathing is for the purpose of saving nitrous oxid and oxygen. I was aware of the large percentage of nitrous oxid in the air expired by the patient during nitrous oxid and oxygen anesthesia, this amount being about eighty per cent., and I have utilized the exhalations as much as I could, still keeping the tension of nitrous oxid up to the extent necessary to produce surgical anesthesia, and allowing enough oxygen to eliminate the asphyxial factor entering into the anesthesia.

Gatch(8), at Johns Hopkins Hospital, has employed the method of rebreathing in a large number of cases, and is very enthusiastic over its use, claiming great benefit, not only in the saving of nitrous oxid and oxygen, but in the increased percentage of carbon dioxid inhaled.

Prof. Yandell Henderson(9) of Yale, in a recent work on "Shock," claims that shock is due to a diminished amount of carbon dioxid in the blood and tissues of the body. Gatch reasons that by the increased rapidity and depth of the respirations, when a patient is under nitrous oxid and oxygen, there is an over-ventilation of the lungs which results in an abnormally great exhalation of carbon dioxid. It is advantageous, therefore, to allow the patient to rebreathe the exhalations in order to prevent the percentage of carbon dioxid in the blood from becoming subnormal.

Gatch(10) advocates the rebreathing of 10 liters of gas from three to five minutes, then empty, recharge, and repeat until completion of the operation. Remarkable results have been obtained by this method, but I have been able to obtain more uniformly even and deep anesthesia by using the continuous, even flow of both gases, and allowing as much rebreathing as I could, without lightening the narcosis.

The average patient under nitrous oxid and oxygen will breathe 600 cc. at each inhalation, and will inhale on an average thirty times per minute, thus consuming 1080 liters or 270 gallons of gas per hour. By the method of rebreathing which I employ, on an average 100 gallons of nitrous oxid and 20 gallons of oxygen per hour are utilized. The difference between 270 and 120 is 150 gallons, which represents the amount rebreathed. With this amount of rebreathing there is no danger of carbon dioxid poisoning, nor is there enough carbon dioxid present to lower the tension of the nitrous oxid below that necessary to produce surgical anesthesia.

The proper amount of rebreathing of nitrous oxid must be governed by the symptoms in each individual case. A healthy, robust, energetic patient of much vitality will tolerate only a small amount of rebreathing, while an anemic, placid, frail patient will tolerate an exceptionally great amount of rebreathing. An excessive amount of carbon dioxid will be manifested by forced respiratory efforts at first, followed by sweating, livid appearance, slowing of pulse, and finally, cessation of respiration. Oxygen is added to prevent the excess of carbon dioxid, and fresh nitrous oxid must therefore be admitted to prevent the narcosis from becoming too light.

Positive interpulmonary pressure. It is known that the blood will absorb 45 volumes of nitrous oxid to 100 volumes of blood at atmospheric pressure. If the nitrous oxid is administered under increased pressure, the absorption of the gas is increased, to what extent I am not able to state mathematically; but clinically I know this to be a fact. The face inhaler is used, as we employ positive pressure only when inducing anesthesia for major surgery and intrathoracic surgery. The pressure is regulated by a sliding collar on the spiral spring, which rests upon the respiratory valve in the face inhaler. This is the positive pressure valve.

The amount of rebreathing is controlled by this pressure valve, and also the amount of fresh gas allowed to enter the bag from the cylinder. If too great a pressure is being used, the expiration will be forced, and there will be a forcing down of the abdominal viscera. The pressure needed will vary from 4 to 24 millimeters of mercury, and must be regulated for each individual case, in accordance with the symptoms manifested.

A WORD TO THE BEGINNER.

I fully realize the fact that it requires more experience to administer nitrous oxid and oxygen properly, as the anesthetic in general surgery, than it does to administer chloroform or ether, yet it is being employed by constantly increasing numbers of physicians, dentists, and nurses, who are meeting with the best of success and who are loud in their praise of this wonderful anesthetic.

When one has observed the administration of nitrous oxid and oxygen by an expert and understands the fundamental principles involved, then he should commence to obtain experience by administering this anesthetic for minor operations. This should be done when the movements of the patient are of no moment and cause no harm. Experience should also be gained by using the gas as a preliminary to ether. In this way one will become accustomed to the working of the apparatus, and proficient in recognizing the premonitory symptoms of anesthesia and asphyxia, thereby learning what to do in order to produce an even and safe narcosis. It would be foolhardy and dangerous for anyone to attempt to administer nitrous oxid and oxygen for a major operation without having first become familiar with the apparatus and the action of the gases.

This anesthetic will never be manipulated successfully in the hospitals if the anesthetic work is done by the internes, for the reason that the interne is not on this service long enough to become proficient with nitrous oxid and oxygen. I insist that nitrous oxid and oxygen is the anesthetic for the professional anesthetist, and will not come into general favor in any other way. The scope of usefulness and efficiency of nitrous oxid and oxygen depends upon whether the person administering it is an expert or not, because the limitations of this agent depend greatly upon the anesthetist.

The technique necessary for the production of a universally successful narcosis with nitrous oxid and oxygen is not easily or quickly acquired; but anyone who has the making of a good anesthetist can master it, and be able, in the vast majority of cases, to produce surgical anesthesia with relaxation of the musculature sufficient to offer no hindrance to the operating surgeon.

When nitrous oxid and oxygen is to be used for a major operation, some narcotic, such as morphine—from $\frac{1}{8}$ to $\frac{1}{4}$ grain—and atropin—from 1/140 to 1/100 grain—should be administered hypodermically half an hour before the operation; or morphin—from $\frac{1}{8}$ to $\frac{1}{6}$ grain—and scopolamin—from 1/120 to 1/100 grain—two hours before the operation. The first combination is in more general use and is probably safer than the second, which should be used with caution and in selected cases.

About three months ago, my attention was called to a new narcotic called "Pantopon"(11), which had been used in Europe with great success by Sahli, Raffalovitch, Grafenberg, and others. It is a derivative of opium, containing, as the name implies, all the alkaloids of opium which are soluble in hydrochloric acid. It is given hypodermically in from $\frac{1}{6}$ to $\frac{1}{3}$ grain doses, one half-hour before operation. I have found that the patients, when I use pantopon, do not vomit during the anesthesia as they sometimes do when morphin is used. There is also less nausea upon recovery. The respirations are less frequent, but deeper and more regular. My results with pantopon, so far, have been most excellent.

NITROUS OXID AND ITS USE IN DENTISTRY.

What I have said above pertains to nitrous oxid and oxygen as a general anesthetic in surgery, but all of these principles can be utilized with nitrous oxid and oxygen in dental practice. This anesthetic has always had a place in dentistry, and those who are not fully advised on the subject still maintain that it is widely applicable in dentistry but has a very limited place in general surgery. My experience and that of others has proved that nitrous oxid and oxygen, with a few modifications in the hands of an expert, is pre-eminently the anesthetic of choice for all operations.

The dental profession has been asked from time to time to discard the old tried and true nitrous oxid for other agents, but it holds a place in the dental profession today that no other anesthetic will ever usurp. Up to this time, nitrous oxid has been used principally to make the extracting of teeth painless; the time is fast approaching, however, when every dentist will have an apparatus for administering nitrous oxid and oxygen, so that all operative work may be done without causing pain to the patient.

I will endeavor to explain the technique involved in the continuous administration of nitrous oxid and oxygen for oral operations in which complete unconsciousness is required until the completion of the operation. Let us suppose a case in which a large number of teeth or an impacted tooth are to be extracted, or a tumor is to be removed from the jaw, or the antrum of Highmore is to be opened and curreted through the mouth. The nasal inhaler, only, is employed in all dental work. The valve from the nitrous oxid bag is opened, the inhaler placed upon the nose, using the thumbs of both hands to spread the rubber nasal hood at the bottom so that the sides of the nose will not be encroached upon. The elastic band around the head may not hold the inhaler tightly in place, so that it is always best to have an assistant hold it also. It is absolutely essential that the inhaler should be in coaptation with the face at all points.

The exhaling valve should be screwed up so that the patient can exhale through the nose. A mouth-prop that will not protrude from the mouth should be placed in the desired position. The nitrous oxid is allowed to flow slowly, but the bag should be kept full. The oxygen bag should be kept full also, and oxygen should be admitted in a small percentage from the start, gradually increasing the amount as slight cyanosis is noticed. Anesthesia should be induced in from about one and a half to two minutes. Unconsciousness will be obtained probably in the majority of cases within twenty to thirty seconds; anesthesia, however, is not established so quickly, from one and a half to two minutes being short enough to induce this state. Should the patient breathe through the mouth before he is anesthetized, a quarter of a rubber ball of the size of a grape fruit is placed over the mouth, which will completely shut out the entrance of air. This is important. When sufficiently deep anesthesia has been obtained, the rubber is removed from the mouth. If the patient commences to breathe through the mouth, the exhaling valve should be closed, the inhaler held firmly in place, and the nitrous oxid forced, until the pressure is sufficient to maintain anesthesia. The oxygen is forced also, but less will be necessary, as the patient cannot be prevented from receiving some air also. I use surgical sponges, which I pack into the posterior part of the mouth, and which are a great help in excluding the entrance of air and also in keeping blood out of the throat. These sponges can be changed as they become saturated with blood, and they will be found to be very helpful.

It is a comparatively simple matter to keep the patient under the influence of nitrous oxid and oxygen after the first five minutes. As a matter of fact patients are not thoroughly anesthetized much before that time. It is not necessary to force the nitrous oxid, if the patient continues to inhale and exhale through the nose, but a continuous and even flow of the nitrous oxid with from about 8 to 12 per cent. of oxygen will keep the average patient in a quiet sleep.

The same technique is used in administering nitrous oxid and oxygen for the removal of tonsils and adenoids up to the time when the surgeon commences to operate. The patient should be lying down, so that the blood will not be inspired. From two to three minutes should be consumed in getting these patients well under the influence of the anesthetic, for the throat reflexes are the last to be abolished. When complete anesthesia has been obtained, the nitrous oxid and oxygen are forced, the exhaling valve, of course, is closed, a mouth-prop is inserted, and the mouth-tube placed in position. The reason for using the mouth-tube in these cases is to prevent the spattering of blood in the operator's face. This was one of the chief drawbacks in this class of work before I commenced to use the mouth-tube in connection with the nasal inhaler. Dr. Gwathmey saw some of our work in Cleveland, and asked if I had ever tried the mouth-tube in the way just explained. I had not, but proceeded to do so in our next morning's work, and found it to be a great help indeed. I had used the mouth-tube in cleft-palate and hare-lip operations many times; in fact, I designed the mouth-tube for this class of cases, finding it to be one of the greatest helps in the most difficult cases for which I am called upon to administer the anesthetic.

It is sometimes desirable in throat surgery to administer about 3 per cent. of ether with the nitrous oxid and oxygen, as it is impossible to keep some patients anesthetized without its use. The small amount of ether used here will not produce any bad effect, and will render many anesthesias safer than they would be if they were manipulated with nitrous oxid alone.

ANALGESIA.

One of the greatest opportunities that has ever been presented to the members of the dental profession is the use of nitrous oxid and oxygen for inducing the condition known as analgesia. During this condition, most of the painful portions of the operative work in dentistry can be eliminated. Why this method has not come into more general use I cannot understand. Dr. Geo. T. Gregg of Pittsburgh, Pa., wrote an article on this subject, which was read before the New York Odontological Society, and published in the March 1910 issue of the DENTAL COSMOS. I have called attention to this method a number of times in the last eight years, and am glad to learn that an increasing number of dentists are using it, and are reporting excellent results. The technique of producing analgesia is not difficult to acquire, nor is it accompanied with danger to the patient. Unless it is correctly executed, however, good results will not be obtained. In the first place, it is imperative that the confidence of the patient be secured by the anesthetist—taking it for granted that the anesthetist has confidence in himself.

The proper technique for producing analgesia is as follows: The bags are filled with the gases, the inhaler is adjusted accurately, the air-valve at the side of the inhaler is opened, and the patient is instructed to breathe through the nose. The rubber dam may or may not be applied, according to indications. After the gas has been about emptied from the nitrous oxid bag, the oxygen valve is opened to six per cent., and oxygen is allowed to flow all the time from the cylinder fast enough to keep this bag well distended. A very small amount of nitrous oxid is allowed to flow from the cylinder. Most operators make the mistake of anesthetizing their patients too far, and try to work upon them in the second, or excitable stage of anesthesia. This stage is too deep and unsatisfactory, both to the patient and the dentist. The nitrous oxid bag is allowed to be almost collapsed all the time, it not being necessary in most cases to use much more than one or two gallons of gas in five minutes.

A condition will soon be induced which resembles that of intoxication, accompanied by a numb feeling, which is not disagreeable, and during this condition the most sensitive tooth can be operated upon without producing any appreciable pain to the patient in the majority of cases.

From my experience with this anesthetic I can say that there is no danger connected with this form of treatment, and the most nervous and diseased patient can take it without the least hesitation. It is understood, of course, that the patients are not to be carried to the unconscious state at any time, but are to be in control of all their mental faculties at all times.

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SOME THOUGHTS ON DENTAL AMALGAM ALLOYS, AND A DISCOVERY.

By **WM. W. ATKINSON**, Philadelphia, Pa.

(Read at the annual meetings of the Southern New Jersey Dental Society, May 15, 1912, and the Mercer Dental Society, June 13, 1912.)

THE practical side of the question of amalgam alloys is of great importance to dentistry; a careful study, therefore, of the nature of the metals used in amalgam alloys and their properties in given combinations is imperative, that the dentist may know the material upon which so much depends.

THE METALS.

Silver. Silver is the metal used in highest proportion, for of all the metals it most promptly forms a crystal with mercury, and so has the leading property of "setting." Its amalgam resists stress, *i.e.* is rigid, but, being a simple compound, readily forms new combinations by solution in the oral fluids. It discolors quickly and undergoes an expansion during setting that would shatter frail cavity walls. Silver, then, for use in dental amalgams must be modified by metals having opposite qualities.

Tin. Tin, next to mercury, has the lowest melting-point of the metals used in dental amalgams. It resists the chemical action of the oral fluids and so sets up a balance, in combination with silver, against discoloration. Its softness gives plasticity and, as in bronzes, its whiteness is imparted to its amalgams. Although pure tin-amalgam increases in volume in setting, it nevertheless counteracts the volumetric increase of silver. According to McCauley,* silver-tin alloys containing 25.5 per cent. or less of tin increase in volume in combination with mercury; when, however, the tin is in excess of the percentage noted, the amalgam decreases in volume, or contracts.

Copper. Copper is a very important metal in amalgam alloys. Some investigators have attributed to it marked value as a tooth-preserving germicide. It is probable, however, that its property of expanding in combining with silver is the more potent factor, for a filling containing copper and otherwise balanced expands in setting, and so is sealed within the cavity. Copper salts are germicidal but the metal itself is not, and I shall instance an amalgam containing a heavy percentage of copper which, after a long period of use under close observation, has not discolored the teeth in which it was placed—proving the absence of the salts of copper—but has preserved the teeth from caries, thus proving that the fillings have expanded and sealed the cavities against ingress of bacteria. Black, in his wonderful physical tests, found pure copper amalgam to have no flow; it sustains enormous increasing pressure, until a critical point is reached, and then suddenly breaks into fragments.

The binary mixture copper and mercury is, however, an unstable amalgam, as the same conditions apply here as in silver amalgam. It readily changes into other combinations in the oral fluids, and so discolors the teeth and washes away. The functions of copper in an amalgam alloy are, therefore, to furnish strength, to aid in balancing the alloy, so that its amalgam after setting shall be stable, and to contribute a slight expansion until the setting is complete.

Zinc. Zinc has but one function, viz, to give whiteness to a filling. Amalgams containing zinc are harsh, coarse-grained, and brittle, and undergo severe volume changes in both directions. The crystals of zinc are enormous compared to those of gold, silver, or copper, and have a loose organization, their cleavage lines being plainly visible; this property is contributed to alloys containing zinc.

Gold. Gold in small percentage enters into many amalgam alloys. It has little if any effect on the color of a filling, for it neither whitens it nor aids in the preservation of color. Gold in the proportion of 1 per cent. or more imparts the quality of plasticity, reduces the coarse grain of zinc, and has a great affinity for mercury.

Platinum. Platinum, by reason of its tendency to determine to the center of a cooling mass of alloy, is at best an uncertain quantity, and its addition to an alloy in the proportions which are customary has little effect. It will therefore be ignored aside from this explanatory note, as will be also nickel, cadmium, bismuth, and aluminum. Their values are either not proved or the weight of evidence is against them.

BALANCING ALLOYS.

From the metals noted it is the task of the metallurgist to make such combinations as will, when combined with mercury, form an amalgam that is rigid and susceptible to a high finish, that sets quickly and undergoes volume movements tending toward a slight expansion. It must be light in color, but not necessarily white, and must be chemically inert, so that it cannot be dissolved in the oral fluids. The metals that show these qualities when they are in proper combination in an amalgam alloy, are silver, tin, and copper. Dr. G. V. Black fully sustains this statement, for he says that—"The addition of small quantities of other metals, except copper, to the silver-tin alloys, has little or no influence on the expansion or contraction of the amalgams." Dr. McCauley has determined expansion at silver 74.5 per cent. plus tin 25.5 per cent. Von Richter states that alloys of silver-copper expand in cooling. So the metallurgist strives to establish a scale in which, when copper is introduced into the silver-tin alloy, he shall find volume balance. Testing along the scale of varying percentages, he finds volume increase as increasing percentages of copper are substituted for silver. It is obvious, therefore, that the tin content must be correspondingly increased, as a counterbalance. The neutral point, then, must be sought where chemical balance is established, so that the amalgam will not give up any of its metals to form salts in the presence of the oral fluids.

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* "Amalgams: Their Manufacture, Manipulation, and Physical Properties." By E. M. McCauley, B.S., D.D.S., DENTAL COSMOS, February 1912, p. 174.

G. V. BLACK ALLOYS.

Striking features are shown in the following analyses made of several leading G. V. Black alloys by Dr. P. S. Burns of the Massachusetts Institute of Technology in 1908 for the committee on alloys of the New York Institute of Stomatology, and published in the June 1908 issue of the *Journal of the Allied Societies:*

Percentage:	Ag.	Sn.	Cu.	Zn.	Au.
True Dentalloy	65.91	27.13	5.21	1.52	
Twentieth Century ..	67.03	27.13	4.87	1.10	
Fellowship ..	67.45	26.80	5.73	0.55	
C. A. S.	66.54	27.16	5.02	0.90	
Odontographic	66.87	26.48	6.21	trace	0.28

Professor Black by his elaborate experiments established the requirements for an amalgam alloy, and though he did not give a definite formula, it was obvious from his tables that the basic formula Ag 60; Sn 35; Cu 5—Prof. J. Foster Flagg's Submarine Alloy—with plus 5 per cent. Ag and minus 5 per cent. tin, the copper content being unchanged, approximated his ideal.

This was taken up by a number of metallurgists, each working independently and provided with Dr. Black's apparatus for testing. The result of their work was the claim that each of the alloys expands 1/20,000 inch, and each resists a stress of several hundred pounds; yet the percentages of any given metal do not coincide, with the exception of the tin contents in True Dentalloy and Twentieth Century alloy. The zinc content varies from 1.52 per cent. in True Dentalloy to a trace, viz, 0.001 per cent. in Odontographic. The copper content varies from 6.21 per cent. in Odontographic to 4.87 per cent. in Twentieth Century, but the ratio of difference between the silver and tin percentages is comparatively small. The sum of the percentages divided by 5—the number of alloys noted—gives the following averages: Ag 66.76, Sn 26.92, Cu 5.408, Zn 0.814, Au 0.056, and therein lies the significant fact that these empirical experiments were successful only when the formula approached the percentage nearest to the established chemical compound of tin and silver, Ag_3Sn—for Ag_3Sn = Ag. 73.1 per cent. + Sn 26.9 per cent., and the averages of the percentages of silver and tin show the following results when in mutual relationship:

Average of
66.76 parts silver = 71.264 per cent.
26.92 " tin = 28.736 "

This undoubtedly results in the formation of Ag_3Sn + the excess of silver and tin which combines with copper and zinc to form mixed crystals, so that the mixture or alloy consists of Ag_3Sn + mixed crystals and eutectic of silver, tin, copper, zinc, and, in the case of Odontographic alloy, gold. It is probable that an alloy made to conform to the average formula would exhibit the same physical characteristics as any one of the five formulæ in the table. The zinc content, however, should, by its negative electrical relation to the copper content, set up disturbances that would result in volume changes of its amalgams.

The demand for white alloys is unfortunate, since it encourages the use of zinc, and the manufacturer surely cannot be blamed for this error. Amalgams made from chemically balanced alloys do not discolor, although they do not nor cannot contain zinc, for the electrical and chemical affinities are satisfied. A surface discoloration occurs when a patient is taking the iodids medicinally, but zinc in this instance affords no protection.

MELTING ALLOYS.

The melting of an alloy is the next consideration, for the ingot must be a mass of evenly distributed crystals in valence, or in which the molecules are uniform compounds of the metals used. To produce an ingot of alloy that is a true chemical compound it is not sufficient merely to melt the component metals together in the ratio of their atomic weights, for gravitational crystals may form through unscientific melting, and the ingot of alloy be progressively richer in the heavier metals toward the base. This is explained by the fact that atomic weight bears little apparent relation to specific weight; thus silver, with an atomic weight of 108 and a specific weight of 10.50, is about 40 per cent. heavier than tin with an atomic weight of 119 but a specific weight of only 7.29. Atomic weight is the actual proportion of specific weight in which one element will combine with another to form a chemical compound, while specific weight is the expression of the force of gravity on an object of any kind.

In salts, the atomic ratio is constant, but in compounds of metals made by dissolving the metals in each other through the medium of heat, no such constancy exists, and we thus encounter the phenomenon of the eutectic mixture above and around the chemical crystals, this eutectic having the lowest melting-point of the mass.

The laws of intimate contact and combining temperature (see Thermo-chemical Phenomena, Von Richter's "Inorganic Chemistry") are important factors in the formation of chemical amalgam alloys. The infinitely small atoms—of the several metals—conjectured to be in dimension between one-half billionth and one and one-quarter billionth inch, must, by prolonged heating at a point above their combining temperature, be brought into such intimate contact that the new molecule may form.

The melted metals must also be protected against oxidation and other chemical changes, and their temperature must never rise to the point of dissociation. (Compare dissociation of water.)

Aging of alloys. The phenomenon of aging, noted by Flagg, Black, and others, has received confirmation through the experiments of McBain and Joyner, published in the DENTAL COSMOS of June 1912, but has been left unexplained by all these investigators.

It was dismissed in an indefinite and unsatisfactory way by Fenchel* as "an easily interpreted physical phenomenon." McBain and Joyner state in the paper just mentioned that aged filings retain less than one-half of the amount of mercury than do fresh-cut filings.

With the conclusion of these investigators, however, that aging is not connected with the release of mechanical strain by annealing, the writer must take issue, for the annealing of a metal or an alloy of metals that is from any cause in a state of compression, invariably effects that change. For instance, after flattening an ingot of gold to a thinner gage its molecules are in a state of condensation—tension of compression—which is relieved by proper annealing. The writer has frequently made micrometric measurements of such plate before and after annealing, and has observed that the volume change or increased thickness amounts to 3 per cent. or more. It may be asked how an ingot of alloy can be in a state of compression similar to rolled sheet metal, if no mechanical means have been used to effect such a state, but reflection will show that several factors enter into this question. For instance, the temperature of the alloy when poured—whether far above the mean melting-point of the mass or only a few degrees above; also the temperature of the ingot mold—whether warm or chilled so that the molten metal shall quickly solidify. Thus, if the alloy be at a temperature 200° above its mean melting-point and the ingot mold well chilled, the ingot will be of less than normal volume and of more than normal specific weight, and its molecules will exhibit the tension of condensation. Metallurgists use this means of securing a homogeneous ingot, and the result is often evidenced by the brittleness of such ingots in amalgam alloys of high grade, for they are easily fractured, particularly if their copper content is high. Does not this indicate that enormous energy is lost under the stress of sudden cooling, resulting in a tense binding of the molecules —or, in other words, that here the law of molecular attraction is shown in its strongest expression? Admitting this, we have a clear explanation of the phenomenon, for it follows that some external form of superior energy, either thermal, mechanical, or chemical, must be introduced to overcome the effects of the laws cited.

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* "Some New Researches into Amalgams." By A. Fenchel, Sc.D., L.D.S., Hamburg. DENTAL COSMOS, January 1909, page 1.

The requirement of thermal energy is met by annealing the filings at moderate temperature for a long period, or, as stated by McCauley, by maintaining them at the boiling-point of water for fifteen minutes. Mechanically the filings may be agitated in a revolving drum, or, if they are simply stored away in bottles, the true aging of time will occur, cosmic vibrations supplying the needed external energy, with probably the additional impetus of slight electrical oscillations.

The significant part of this argument is, however, that more mercury is required in freshly cut than in aged filings. Here we meet the requirement of "chemical energy," and through the violence of amalgamation we are able to see its effect in the properties of rapid setting, and subsequent internal motion and volume change due to the excess of mercury which was needed to release, by its own energy, the force of molecular attraction.

Despite the statement of McBain and Joyner to the contrary, oxidation does play a part in retarding the setting process, for aged filings, amalgamated under dilute sulfuric acid and subsequently washed with a solution of sodium bicarbonate and dried, set more quickly than when they are amalgamated in the usual way. The experiment of aging under hydrogen does not disprove this, for although some of the air surrounding each of the small particles of alloy may by diffusion—law of diffusion of gases—in the hydrogen be taken away from them, it must be remembered that the surfaces of the filings begin to oxidize at the instant of cutting, and hydrogen does not combine with oxygen to form H_2O at any temperature lower than 200° C. (412° F.); yet amalgam alloy combines with oxygen at a much lower temperature.

DEFINITION OF AMALGAM.

Dr. Kirk has defined amalgams as follows: "Solutions in mercury of such metals as have affinity for it. In virtue of this affinity the several metals, under proper conditions, combine chemically in atomic ratios. The setting of the mass is theoretically a crystallization of definite chemical compounds formed between mercury and the several metals. The object to be sought is the production of a definite chemical body in which the several elements are united in atomic ratio. All of the affinities being satisfied, there results a more stable body than were the components united in any other ratio."

That this definition is correct there can be no doubt, for it is sustained by Petrenko, Fenchel, and other investigators. An amalgam, therefore, is a chemical solution of metals in mercury, but it should be observed that the beginning of this solution is physical, and rests on the fact that mercury has a lower melting-point than any of the metals which it dissolves, and that its activity as a solvent ceases after its identity is merged in a crystal of chemical equivalence the mean melting-point of which has been raised above the melting-point of the mercury.

THE CUT OF ALLOYS.

Flagg, Black, and others state that a coarse-cut alloy makes a stronger amalgam than a fine-cut alloy, but they do not give the reason therefor. If we follow the chapter on Amalgams in the fourth edition of Kirk's "American Text-book of Dentistry," wherein the parallel is made between an amalgam filling and a concrete wall, we shall find the explanation. The coarse particles of alloy represent the broken stone reinforcement, and the alloy thus combined with mercury represents the cement which binds the mass. My own tests have amply demonstrated this, and I therefore confirm it as a fact, for in experimenting with the cut of alloys I have used at times the flotation method of securing a very fine powder, so fine in fact that it resembled powdered graphite, and in order to secure its admixture with mercury it was necessary to use dilute sulfuric acid as a deoxidizing flux. In another experiment the alloy was ground together with an excess of mercury in a Wedgewood mortar until the mass was almost fluid. The resultant amalgams were entirely unsatisfactory; they shrank irrespective of the formula of the alloy base, and had little strength.

These phenomena were due to the excessive mercury content made possible by the fineness of the alloy dust. Coarse-cut alloys, therefore, are the best, for less mercury can be incorporated in them, and the large solid alloy filings give their strength to the mass and are held together by the cementing amalgam around them.

THEORIES OF AMALGAM ALLOYS.

There are two theories regarding amalgam alloys, the physical and the chemical. The first holds that alloys are probably solid cold solutions of two or more metals within each other, and may be varied in percentages irrespectively of their atomic relation, and to be satisfactory must meet certain requirements in the matter of strength and volume change. According to this theory, an amalgam must expand 1/20,000 inch in setting, and should withstand all stress of mastication.

The other theory is that all alloys should be made in chemical equivalence; that is, that the combining ratio of the metals is their atomic ratio, and that balance is only possible in this way. Both theories are correct in some respects. The first states the correct physical requirements of an amalgam, and the other points out the scientific means of attaining them. Both schools are in error in other respects, for, on the one hand, given percentages of given metals in combination with mercury will produce certain desired results, while, on the other hand, the mere fact of chemical crystallization does not necessarily meet the physical requirements, for the crystal may be too soft or its volume change may be toward condensation.

A DISCOVERY AND A NEW AMALGAM ALLOY.

It will be seen that I am an advocate of the chemical theory of amalgam alloys. Reason tells me that if the atomic law applies to the metals when they dissolve in other elements, it must, with equal force, apply to the metals when dissolved in each other. In September 1911, therefore, I deduced an alloy formula, with the metals in atomic ratio. It is based on the theory that chemical balance, other things being equal, is physical balance, and that silver, tin, and copper, by reason of their observed properties, are the most trustworthy metals with which to compound an amalgam alloy. Experiments were made to test my conclusions, which were entirely confirmed. The alloy compounded is the amalgam alloy instanced in another part of this paper. Its formula is Ag_2SnCu.

It is a ternary compound; the tin quadrivalent and its amalgam appears to be a true quaternary compound—modified, of course, by the principle of coarse-cut filings previously enunciated. Although the alloy is entirely my own, its formula received passing notice from Dr. Burchard, in a paper published in the DENTAL COSMOS of December 1895, Dr. Burchard stating that Ag_2SnCu was the nearest chemical formula to Dr. Black's 65Ag-30Sn-5Cu, and that an alloy of this formula had never been made or tested. As this copy of the COSMOS fell into my hands less than one week ago, it will be seen that my deductions were based only upon observed facts and the chemical theory, and that these alone culminated in what must be conceded to be an original discovery.

CONCLUSIONS.

The metals known to be best adapted for dental amalgam alloys are silver, tin, and copper. Their best expression is that of chemical equivalence; their best compound is Ag_2SnCu. The best amalgam filling is possible only when the alloy filings are coarse-cut, and therefore smooth-working alloys are not to be trusted. The era of empirical or purely commercial amalgam alloys is fortunately drawing to a close.

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PROCEEDINGS OF SOCIETIES.

DENTAL SOCIETY OF THE STATE OF NEW YORK.

Forty-fourth Annual Meeting.

FIRST DAY—*Afternoon Session.*

THE forty-fourth annual meeting of the Dental Society of the State of New York was opened on Thursday afternoon, May 9, 1912, in the assembly room of the Ten Eyck Hotel, Albany, N. Y.

The president, Dr. Ellison Hillyer, Brooklyn, called the meeting to order at 2 o'clock.

The Rev. Dr. R. H. Brooks, St. Paul's Church, Albany, invoked divine blessings on the deliberations of the society.

The first order of business was the report of the Business Committee by Dr. H. J. Burkhart, chairman, which was in effect the same as that in the printed program.

The vice-president, Dr. Baylis, took the chair, while the president, Dr. HILLYER, read his annual address, as follows:

PRESIDENT'S ADDRESS.

Another cycle of time has passed in our onward march of progress, and again we are convened among congenial surroundings and in the midst of the many friends whom we look forward to meeting from year to year. As your chosen presiding officer I welcome you all to this, the forty-fourth annual gathering of our society, with the hope that each may feel that there are many opportunities afforded for mutual enjoyment and improvement, and with the sincere wish that everyone may leave the convention feeling amply repaid for having attended. There are some new faces among the audience, faces of those who have lately been delegated by the various districts, as well as of those who have been drawn by our cordial invitation to attend this session; to these I extend an added welcome. As the years pass by, the associations which you will here form and foster will be among the most cherished of your lives. Those who regularly attend these gatherings realize how much it means to feel that the profession's progress is being aided by their loyal and united efforts.

NECROLOGY.

Our ranks have been broken during the past year, and both east and west have bowed their heads in grave submission to the divine will. It is hard to close up the ranks when such men as Samuel A. Freeman and Safford G. Perry are called away. By a strange coincidence Dr. Freeman was, at the time of his death, the chairman of the Fellowship Committee, which at its meeting in 1911 elected Dr. Perry as fellow for 1912. Had Dr. Perry been spared, he, as chairman of the Committee on Necrology, would have presented at this session a eulogy of Dr. Freeman. These two eminent representatives of our profession—one from the western, the other from the eastern part of the state—passed away within a few days of each other, just as the year 1911 was drawing to its close.

Those of us who were close to Dr. Perry will never be able to fill the void caused by his absence. To your president, the anticipation of the duty of conveying the mark of your appreciation by delivering to him the Fellowship medal made the more arduous duties connected with this office appear lighter.

One great regret we all must share lies in the fact that Dr. Perry had announced, when notified of his election, that his Fellowship thesis—which would have been given at this session—was to be the masterpiece of his literary career. What a pity that this essay on "Conservatism" upon which he was working should not have been completed, that we might have had this crowning contribution to that long list of writings which are such a source of inspiration and helpfulness to myriads of his fellow practitioners.

It has seemed appropriate that the time which had been allotted to Dr. Perry at this meeting should be set apart to admit of the opportunity of paying to his memory a tribute which will be world-wide in its scope.

Three other members have lately been added to the death roll—Dr. C. J. Barber of Auburn, Dr. T. C. Phillips of Buffalo, and Dr. C. R. Holt of Westport. A tribute to their memory will be paid by our Necrology Committee.

MEMBERSHIP.

Pursuing the custom which has become prevalent, your president has traversed the state and visited all but one of the district societies during the year. A combination of circumstances alone prevented meeting with the Sixth District Society. In addition to these, he has visited several societies outside of the regular organizations, and in all cases has found an excellent condition prevailing. There is evident a spirit of progressiveness, added to an optimistic feeling that the profession is advancing steadily. While the increase in membership is not what it should be, there is a perceptible improvement, as shown by the fact that exclusive of loss of membership by either death or resignation, the First district has an added active list of 44; the Second district one of 18; the Third district 1; the Fourth district 7; the Fifth district 10; the Sixth district 3; the Seventh district 1; the Eighth district 20, and the Ninth district 3. These figures, when viewing the actual active membership of all the district societies of about 1400 as compared with the 5000 and more registered dentists of the state, make it apparent that either the desire to restrict membership is over-strong, or that there is a laxity in the endeavor to bring within the ranks eligible men who would be an addition to the society membership in every way.

It has been impressed upon your president that certain conditions, due to the geographical location and great extent of boundary of some of the districts, are working a hardship upon the men already members, and forming an obstacle to others who might be added to the lists. This condition has been proved to exist in the northern counties of the Fourth district; it is practically impossible for men in these counties to attend meetings except at a sacrifice of days, in order to travel the distances involved in going and returning. This state of affairs also exists in the Ninth district; the men in Westchester, who have a flourishing local society, called the Westchester County Dental Society, are allied with men in Orange, Rockland, Putnam, and Dutchess counties, and the wide divergence of distances makes it equally impracticable for them to meet upon common ground without great sacrifice, which few, even though they be so disposed, are able to afford.* This might be easily remedied to the advantage of all concerned if the various districts were privileged to so change their by-laws as *to admit of men in various localities meeting in sections under properly provided chairmanship.* The aggregate of the work accomplished by these sections would make up the work of the district, and the membership of all would comprise the district society membership. Such local membership would thus be much better safeguarded, and the good work that is already being done could be extended to those who have not benefited therefrom up to this time. The First district divides its work into sections within the district, and should be complimented upon the success obtained. If the First district, in its circumscribed area, why not any other district with its enlarged boundary?

MEMBERSHIP IN THE STATE SOCIETY.

There is also apparent in every direction the feeling that the time is fast approaching when the limitations of our State Society membership should be enlarged.

Your president has carefully considered every apparent phase of this question, and appreciates that there are many arguments for and against any change in the present status of the society membership. It has, however, for many years been his opinion that it was the thought of the founders of this society, in 1868, that *the district societies were really the State Society,* and that the gathering at the end of the winter activities should be an annual convocation here in Albany of the various district societies. Were this not so, why should delegates be appointed to represent the district, or why should the full report of the districts be required for publication in the proceedings of this body. If the districts are really a part of the State Society, then why not inscribe the full membership of the districts upon the roll of the State Society? Is the membership in the latter such a prize to be striven for that only a very few—eighteen delegate and eighteen permanent—from the whole state may be admitted to membership? At this rate it would not be difficult to compute how many generations it would take for some of our members to gain entrance. The question arises, What advantage is there in an enlarged society membership? That the work done by this society for forty-four years will compare favorably in every way with that of any other state in the Union I am ready to assert emphatically, and this can be also readily confirmed by the records.

No society is so good, however, that it may not improve, and it is concerning this opportunity for improvement that those who have the interests of New York State at heart have been eagerly investigating. To extend our good work, the treasury has to be considered. Exclusive of receipts from various sources, which have no bearing upon this subject, and covering amounts received from members only—permanent, district, and college delegates—the 1911 report shows an income of $1235. This is at the rate of three dollars for each membership. If the roll of this body included the membership of the districts at the rate of two dollars each, this would be about $2800, an advance of about $1600 on this item alone. The calculation of a reduced membership fee is made in order that those who enter upon the roll of a district society should not find any perceptible burden added to the dues already provided for in the district. With an enlarged treasury, opportunities of advancement along many lines might be possible which are circumscribed today. The greatest argument against a change seems to be in the minds of those who think that an influx of a large membership would entail a large voting power which might jeopard the interests of some sections of the state. Observation of the state's affairs has failed to disclose any tendency on the part of any one section to usurp the rights or prerogatives of another. This, however, could easily be controlled beyond any peradventure by retaining our existing form of government, and placing the voting power in the hands of our Executive Council, thus giving equal representation to every district. This would be eminently fair, and I am sure would perpetuate the intentions of the founders and work for the best interests of the society.

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* In the Second district, where Kings, Queens, Richmond, Nassau, and Suffolk counties are allied, there are but few men on the rolls outside of Kings county. Were the plan proposed adopted, local sections could be very profitably carried on in Richmond and the counties of Long Island.

LEGISLATION.

The moral influence of a large representative membership has an inevitable bearing upon legislation. While personal influence has and always will have an enormous weight, the power of numbers counts for or against bills introduced in behalf of or instigated as detrimental to the society interests.

It may be interesting to you that a bill has passed the legislature rendering it possible for the society to make these changes in our membership when the proper time arrives. I will leave it to the Committee on Amendments to report in full the extensive work of the year.

ILLEGAL PRACTICE.

With an increased treasury more effort to uphold the observance of the dental law might be made possible. There have come to your president's attention various questions regarding the attitude of the society's Law Committee toward the prosecution of offenders. Nowhere have I heard any but the highest compliment paid to the chairman, who for many years has guided the work of this committee. Unquestionably, if there be any just criticism, it is that no one man known to us today could be expected to cope with the tremendous difficulties which confront one who is striving to carry on this work. It seems wise to propose to the various districts that an enlarged local committee, covering the entire territory, should be named by the district to work under the chairmanship of the district members of the state Law Committee. This would certainly assist greatly in lightening the burden of the state committee, and also be productive of great results if fully carried out. An excellent plan has been tried in Missouri, as well as in certain countries abroad, which has assisted in suppressing illegal practice. A law has been in force in Missouri for about five years which requires every dentist qualified to practice to register every year, paying a fee of one dollar. This, if enacted in this state, would create a fund of at least $5000 a year with which to further the work of the Law Committee, and also would have the effect of clearing the calendar, as it were, of all inoperative names. Failure to re-register within thirty days of a given date carries a penalty of revocation of license.

THE DENTAL NURSE.

Possible evasion of the law reminds us of another important matter which is engaging the attention of many of our members. Owing to the great advancement in the movement of oral hygiene, the necessity has arisen for the development of the field of the dental nurse. It is not my intention to anticipate the report of the committee appointed to investigate this matter, but to call the attention of the society to the danger that is liable to lurk in the lawful provision for nurses of either sex to undertake certain dental operations, though limited in their scope. If the field of oral hygiene is as important as every one of us believes it to be, there should be no letting down the bars which are protecting the practice of dentistry today by making it possible for the inexperienced to practice limited operations within the oral cavity. The only safe method to pursue for those who desire to specialize in this important branch is to insist that none but those who hold a degree should be allowed to enter. It is said that graduates are not willing to confine their operations to that particular field. Why? Is it owing to the size of the fee obtainable? Then make the fee equal the operation, and there will be no question of operators. But who will care for the poor? Are not operators filling carious teeth for the poor at fees that the poor can pay? If so, why should they not do prophylactic work for them? Let down the barriers, and the profession, especially in the large cities, will be overrun with dental nurses, who will be doing anything and everything with little to prevent them. The work of your Law Committee might almost as well be abandoned.

DENTAL SURGEONS FOR THE NATIONAL GUARD.

Another subject I desire to bring to your attention. Since the appointment of the dental surgeon in the army and navy has become an established fact, the National Guard of the State of New York has been endeavoring to conform with the regulations of the regular army. At present the medical staff comprises a surgeon, with the rank of major, and three assistants with the rank of captain. Added to these are a hospital staff of non-commissioned officers. Thus far the dental surgeon has had no rank beyond the non-commissioned staff, and your legislative committee's attention is hereby called to the desirability of considering this matter looking toward the introduction into the legislature of a bill placing the dental surgeon upon a plane equivalent, at least, to the rank accorded him in the regular army. That the services of the dental surgeon are essential to the good of the service is proved by the records of a large number of state encampments, which show that about twenty-five per cent. of all cases treated are dental in character, including not only extractions, but treatment of abscesses, necrotic conditions, and temporary fillings.

PROGRAM OF THE MEETING.

In taking up the work of the session, I desire to thank publicly all who have so generously acceded to every request I have made. Such co-operation is well-nigh ideal and I trust the results will be as satisfactory to you as they have been thus far to me. The session will be called as promptly as a quorum is present, and it is planned to morally obligate the required fifteen men to be present on the hours named—2 and 8—in order that there shall be no delay in the program. I congratulate the society upon the attendance of men who have come from a distance to give us of their best. The essayists are all men whom we are proud to entertain.*

The business portion of our work has been delegated to the Executive Council—the hardest worked body in our midst. It is absolutely unfair to them and to ourselves that their sessions should be as prolonged as they have been for the past years. Let me recommend that the sessions of the council be held at hours other than those scheduled for the main body. Matters which are to be considered by them should be scheduled upon a bulletin board, in order that those desiring to attend or to address the council or to debate any matter should lose no time in waiting nor be ignorant when a subject is to come up. Debate before the council should be reasonably limited, so that no time be wasted. A full stenographic report of the council business should be provided, and a duplicate record should be kept by the secretary for reference at any time during the year.

Your Committee on Practice—for

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* The Clinic Committee has worked faithfully in preparing for the clinic sessions, and we thank them and the clinicians for what they have generously provided. Since the program has been issued additional clinics have been secured, and these will be specially announced. We are especially favored by the exhibit of radiographs shown at the state medical society meeting, which Dr. George M. MacKee and others have most kindly reassembled after they had been taken away two weeks ago.

years named as one man—is, by virtue of the by-laws, a committee of three. In order to correct this your president has named three men and advocates that this committee be made practically a perpetual one, in that but one new member be appointed each year. This would operate so that each man serving three years would, in rotation, report as chairman, having had three years of experience in what the committee has been investigating, and making a consecutive report which would be of great value to the society.

But one other matter before I conclude. Many years ago the Baltimore College of Dental Surgery presented to the society a gavel formed from the handle of an old turnkey and prized for its associations. In some unknown manner this gavel, several years ago, was mislaid, and since then your presiding officer has resorted to various means of calling the unruly to order. To obviate this necessity, the three dental colleges of this state have combined in paying their respects to this society, to which they send delegates, by presenting this gavel, upon which are inscribed the names of all who have held the office of president to date. In delivering to you, on behalf of my *confrères* in all the dental colleges, this token of our appreciation, let me say that we hold in high esteem our college delegate membership in this body. The interests of the society have been carefully guarded by us, and we ask for commensurate consideration. Criticism of college methods and curricula is exceedingly easy to make and is often just. Criticism made in good faith is courted by all the colleges of the land. We ask that you, in such spirit, visit us often and make suggestions, as all are more than willing to follow when the advice is good.

And now the program waits your delectation and digestion. May you all have your fill and be more than satisfied!

Dr. Baylis appointed as the Committee on the President's Address, the following: Dr. R. H. Hutchinson, Dr. H. J. Burkhart, and Dr. W. W. Walker.

The next order of business was the report of the Committee on Practice, by Dr. F. P. HAMLET, Hempstead.

[This paper is printed in full at page 883 of the present issue of the COSMOS.]

Discussion.

Dr. R. H. HOFHEINZ, Rochester. To discuss a report on dental practice affords one endless opportunities. I will, however, restrict myself to a few definite points.

The committee reports that the general trend of operative dentistry of today is on a higher plane than it has ever been before. This is partly true. The present development has given efficient dental operators opportunities which were not dreamed of in their philosophy a generation ago. It has also given the mediocre and careless operator an opportunity to conceal his faults as he never could before.

A physician at my bedside recently said to me: "Anesthesia with its great blessing has given more fools an opportunity to be surgeons than anything else I know of." What applies to anesthetics in surgery applies in a way to the cemented filling in operative dentistry. Aside from all its blessings, poor work can be better concealed by it than was ever possible in previous years.

To discuss the meaning of a perfect occlusion is useless. The one thing that has troubled me in connection with it is the fact that I have seen many more perfect occlusions on diagrams than in human mouths, even after elaborate orthodontic procedures. Yet, if the universal cry for perfect occlusion had brought about nothing more than the discontinuance of the indiscriminate extraction of first molars, it would have filled its mission to a great degree.

The question of prophylaxis received a prominent place and elaborate discussion in the joint report presented by Dr. Hamlet. No question before the profession is of deeper interest to us all. When watching the clinics of some operators of different prophylaxis brands, I have occasionally wondered if we are not overdoing things somewhat. Only the ignorant or the dishonest can underestimate the real value of a systematic prophylaxis. The danger lies in the mad desire either to make a display or to mistake the normal for the abnormal.

Radiography, which is still in its infancy with most of us, has already done miracles in the diagnosing of root conditions, impacted teeth, pericemental complications, fractures, etc.

The committee elaborated considerably on the cast gold inlay. It seems useless for me to add to its eulogy. It has come to stay until a perfect and reliable plastic material will assume supreme command over all other filling materials. A well-known member of the profession told me that in a certain city the tendency is to remove all old gold fillings, good or bad, and replace them with large, showy gold inlays. We are living in an age in which the recall of the judiciary is recommended. Why should anything be of value—even good old gold fillings?

The report says: "The fact that a filling is made of cast gold does not excuse an operator for neglecting to produce a good contact point." I should say it excuses him less than ever. It is infinitely easier to make a proper contact point with a cast inlay than with a malleted gold filling. Dr. Black has called attention to the fact that no contact points should be made of pure cast gold. If pure gold is used for the inlay, the contact point should be built up later with 20-karat gold solder. If a gold containing 3 per cent. of platinum is used, this procedure is unnecessary.

The report tells us that cast porcelain, which at one time seemed to be within our grasp, is still a "will-o'-the-wisp," and that it has not proved reliable in the environments of the mouth. I would like to ask if this refers to chemical or to physical conditions? As far as I have been able to learn, the questions of shading and proper marginal perfection are the principal contentions. I have no doubt, however, that they will be solved in time.

The committee expresses my view on silicate cements when saying that they are "an interesting, enticing, and disappointing proposition." At our Western New York meeting someone made the broad assertion that the silicate cements had taken the place of porcelain, and that the porcelain era had passed. There is but a small percentage of operators on whom the porcelain era has ever dawned, and the majority have been only too willing to become over-enthusiastic on this enticing proposition. In my innermost heart I believe, however, that a plastic material will some day take the place of our metallic fillings and will, at the same time, conform to esthetic demands. I have seen beautiful work done with the silicate cements in such cavities as your committee refers to; in one instance one of my patients had a distal cavity in a lower molar and a mesial cavity in a second bicuspid filled with silicate cement some six years ago. These fillings show absolutely no imperfection —neither chemically nor mechanically— though the occlusion is normal. The work was done by an Italian dentist in Florence. I inquired from him what make of silicate cement he had used, but received no reply. The material his fillings were made of proved better than the stuff he was made of. Such a single instance, however, bids fair promise for the future of the silicates.

The severe censure which came from an English physician regarding the septic conditions of the oral cavity resulting from careless construction and application of crowns and bridges is largely justified. It was not necessary, however, for that writer to censure American dentistry; he could have found plenty of poor English dentistry to stimulate his critical ability. I have often stated that the best and the poorest dentistry is done in America, owing to conditions which require no special discussion at this time.

Septic conditions due to pyorrhea open an endless channel for discussion. It does not seem possible that at the present time any careful observer and thinker can classify all pyorrheal cases either as purely local or as purely constitutional. Not all cases are curable with the orange-wood stick and pumice; neither are they all curable through internal medication. I refer all doubters to the chapter on Pyorrhea in Dr. Kirk's new edition of the "American Text-book of Operative Dentistry."

The committee tells us that oral sepsis resulting from pyorrhea or abscessed teeth requires the best skill possible, and asks: "Will the trained dental nurses be equal to the requirement?" I would like to ask Dr. Hamlet who relegated these operations to the dental nurse? The trained nurse, according to her functions, as first suggested by Dr. Rhein, is not supposed to treat pyorrhea, abscessed teeth, and their sequelæ, but simply to cleanse teeth. Dr. Hoff of Ann Arbor read a paper on this subject in Buffalo a short time ago, and it took us all the evening to discuss it. If the statistics of Dr. Hoff are reliable, the dental nurse will become a necessity, if the benefit of general prophylaxis is to reach humanity at large. The minority has always been well served, but such a blessing as has been bestowed upon us by dental prophylaxis should be extended to the majority of the people, who deserve it equally as much, and need it infinitely more than the minority.

Dr. C. C. Voelker, Brooklyn, N. Y. The last speaker referred to the paper of Dr. N. S. Hoff, read at Buffalo, in November of last year, entitled "How Shall the Profession Meet Its New Obligations Resulting from Its Propaganda of Popular Education in Oral Hygiene and Preventive Dentistry?" I should like to introduce my remarks with a quotation from the same paper. After speaking of the "trained dental nurse" as advocated by Dr. Rhein, the "denticure" of Dr. Wright, the "odontocure" of still another writer, the "prophylactic assistant" of Dr. Fones, and the "tooth-polisher" as Dr. Hoff calls her, this writer sums up the issue in these words:

> We seem to have reached the conclusion that oral prophylaxis, as we at present know and practice it, is successful as a preventive measure, though largely as a technical ministration; and we are in doubt, or perhaps divided, as to who shall administer it, the professionally trained or the technically trained. The trend of our arguments seems to be that the work needed is so vast and universal that an educated profession cannot hope to cope with it creditably alone, or, if at all, at such cost that the masses of the people would necessarily be deprived of its benefits. It is the old question of the ideal and the practicable. Shall we compromise ideals which we confidently approve in order that we may receive temporary advantages?

Before proceeding I should like to impress upon you the necessity of keeping in mind the true meaning of prophylaxis. We cannot discuss the prophylactic assistant without discussing prophylaxis also. But it would require too much time to outline even briefly my conception of the scope of preventive medicine or prophylaxis in dentistry, and I can at this time only refer you to my paper on "The Scope of Prophylaxis in Dentistry," published in the March issue of *Items of Interest.*

To my mind there are two distinct phases to this question of licensing non-graduates: (1) Their employment in private dental offices, taking the place of and receiving a lower remuneration than graduate dentists, to which I am opposed, not alone on account of the legal difficulties involved, but also for the sake of the young members of the profession who are often compelled to get their start in this way. (2) Their employment in public clinics, dispensaries, and schools—the real humanitarian phase of the question—with which, under certain conditions of preliminary education and training and legal restrictions, I am in accord.

The first to bring this matter of the trained dental nurse before the profession was Dr. M. L. Rhein of New York, who presented two papers on this subject before representative dental gatherings in 1903. In these papers, as well as in the discussions thereof, little mention was made of the benefit for humanity idea which has lately characterized the utterances of many of the ardent champions of this cause. Stress was then laid more particularly on the benefit to the private practice of the dentist employing such a nurse, the benefit to the dentist himself, and the opening of a new vocation to women.

Dr. Rhein at that time advocated adding a department for dental nurses to the training schools for medical nurses. The former were to be required to pass a satisfactory preliminary examination, to receive didactic instruction in nursing in general, and special instruction in dental subjects, as well as the necessary manual training. Their practice material was to be taken from the hospital's patients, viz, those about to undergo surgical operations and those applying at the infirmary, whose mouths these nurses were to put in a "sterile" condition, whatever that means. I shall not go into the feasibility of this plan, which practical nurses now engaged in hospital work assure me could not be satisfactorily carried out in hospitals as they are managed at present. Having been graduated from the training school, the dental nurses, Dr. Rhein proposed, should pass a state-board examination, and be registered like the medical nurses of today, which, I suppose, would also include the privilege of adding the letters "R.D.N."—registered dental nurse—after their names. Such license was not, however, to permit them to go around indiscriminately, polishing and scaling teeth and medicating the dental territory. This they would be permitted to do only "under the prescription of the patient's attending dentist," which means of course at that particular dentist's office, and at a salary which he might see fit to give the nurse, or which she would have to take in order to secure the position. In other words, the medical nurse is free to go into the homes of the people and administer to their physical necessities when called upon by those requiring her services; and she may administer medical treatment by order of or in the absence of the patient's attending physician, in cases of emergency. The manicure, the masseuse, the barber, the Christian Science practitioner—all these may enter the homes of the people without restraint, ministering to the physical needs of humanity; but the dental nurse, or denticure, shall not be free to polish the teeth of the public, even when licensed by law to do so, unless she receives permission to practice her profession from the dentist who employs her. The medical nurse is employed by the patient, whose choice is always consulted and may be at variance with that of the attending physician; but in the case of the dental nurse, the patient must accept her services if she be employed by that patient's dentist, or go without. Such a scheme would soon lead to trouble, since it would be against public policy and the constitutional rights of the individual; or, if it could be enforced, it would limit the number of dental nurses able to practice their profession to the few dentists that might require their services. Not many of us can afford to pay a young woman from $20 to $30 per week, simply for polishing teeth and other minor dental operations.

It is fair to assume, furthermore, that the trained and registered dental nurse would, upon graduation, enter a nurse's registry for the securing of employment, a place to live in, and the social intercourse with her fellow dental nurses. If she were licensed to practice her calling and not associated with any dentists, is there anything to prevent her being called in to clean teeth at a patient's home, at the request of a physician or of a dentist other than that patient's regular dentist? No legislation could prevent this, since the law would undoubtedly give the family physician the right to call in a dental nurse for his patients when needed.

Perhaps it was the consideration of some of the legal aspects and entanglements involved in this question of licensing dental nurses or denticures which has recently brought about a change in the points of view of those who most ardently desire them. Finding that strong opposition from the legal standpoint was raised against the idea of licensing non-graduates for work in private offices, even by those who favored them in other respects, these men now harp upon the benefit for humanity aspect of the question, and impugn the motives of those who oppose their views, crying out against such opposition in language more forcible than polite. Permit me to quote from one of the foremost advocates of the trained dental nurse. He says, while discussing the paper of another champion:

> The victory is by no means won so easily. If it were merely a matter of proving the correctness of what the essayist has said, this question would long since have been settled. Unfortunately, it has reached a stage where the opposing forces consist of personal selfishness and aggrandizement, narrowness of conception and shameless cupidity, as opposed to unselfish work for humanity at large.

Continuing in his impassioned diatribe, he says:

> The opponents of the dental nurse may be divided into three classes:
>
> First is the class of dental colleges which is governed by men who fear lest every radical movement may upset the frail foundations upon which their institution rests. The second class is confined to a very small number of men so filled with conceit that the idea of a mere woman being able to wield an orange-wood stick with dexterity comparable to their own is in their eyes nothing short of sacrilege. All this opposition carries with it little weight; but the argument of the third class of opponents is of a different nature. This is composed of men who have never paid any attention to oral hygiene. These practitioners know nothing of the "mouth beautiful" in their own practices, and are influenced in their vicious opposition by everything but love for their fellow men. They appeal to the purse, to the cupidity of the dentist. They claim that the licensing of non-graduates to do prophylactic work would throw down the bars for illegal practitioners, and thereby take away a large part of the practice from the legalized practitioner.

The three classes of opponents spoken of by the gentleman whose words I have taken the liberty of quoting must of necessity include all those whose opinions are on record in our dental literature in opposition to his ideas, among whom I may mention Dr. N. S. Hoff, dean of the faculty of the University of Michigan and editor of the *Dental Register;* Dr. Grace Rogers Spalding, a woman dentist, who wrote in opposition in *The Dentist's Magazine* in June 1906; Dr. W. G. Lewis of Brooklyn, who wrote against it from the legal aspect in the *Dental Dispensary Record;* Drs. Dowsley, Barrett, and G. A. Maxfield of the Massachusetts Board of Registration in Dentistry, and myself. Other prominent men have expressed their opposing views to me in private conversation or by letter. This is surely a goodly company, with whom I take no shame to ally myself, and it is, I hope, proof against the insinuations which I have just quoted. On what tenuous grounds such charges rest I shall endeavor to show by taking up and answering some of the other recorded arguments put forward by the dental nurse champions.

It has been claimed that even though the danger of giving dental nurses free scope to practice were all that the opposition claimed, it would be most unethical for dentists to oppose it. Similar reasoning would make it unethical to oppose illegal practitioners of any sort, and all the work of our law committees would in that case be unethical.

Dr. R. G. Hutchinson of New York, writes me as follows:

> There is no doubt that the establishment of the trained dental nurse as an institution would lead to much abuse and illegal practice of dental operations in general. It is therefore my opinion that at the present time we cannot afford to countenance such procedure. Personally, I should be glad to have the assistance of a competent dental nurse in my office, but am willing to forego that privilege, because I am confident that in the majority of cases more harm than good would result from the general employment of such nurses. As it is impossible to limit the operations which would unquestionably be performed by the dental nurse, I shall be glad to do all in my power to prevent the establishment of such a school.

An argument often brought forward to account for the neglect of efficient prophylaxis and the necessity of having it done by cheaper assistants, is that the work is tedious, monotonous and irksome, and although this work is of paramount importance for the salvation of the teeth, yet remuneration commensurate with the amount of time and labor required to perform faithfully all prophylactic procedures cannot be obtained from patients. But it seems to me that if the same amount of persuasion and education of the public were used to convince them that the *prevention* of dental caries and diseases of the pulp and alveoli is the best service for the salvation of the teeth that the dentist can give, as is now used to convince them of the value of root-canal treatment, the placement of high-priced crown and bridge work, or such difficult heteroplastic operations as the placement of porcelain roots, little difficulty would be experienced in obtaining fees commensurate with the value of the service rendered, especially when we may, at the same time, assure our patients of freedom from much future pain, discomfort, and expense, if efficient prophylaxis be instituted. Any operator who will not hesitate to spend from one to twelve hours in locating and opening difficult and tortuous root-canals is endowed with all the patience, skill, and endurance required in the proper scaling and polishing of a set of teeth; and he is doing more for the ultimate salvation of the teeth of humanity by preventing the necessity for such root-canal and restorative work.

But perhaps the main argument thus far brought forward, and, if I read between the lines correctly, the principal reason for desiring non-graduate female assistants to do prophylaxis work in private dental offices in place of the licensed graduates which the law now requires, is the avowed inability of those who advocate such female assistants to keep associated with themselves, for a sufficient length of time, licensed graduates with the proper training and ambition who would be willing to devote a greater part of their time to this work. They claim that it is not possible to obtain satisfactory results in prophylactic work if it is necessary to place a new assistant in this department at frequent intervals. I hesitate to go into this phase of the subject at any length, because it involves a good deal of the so-called business side of dentistry, and many of us are still apt to look askance at any expression of opinion relating to such a sordid thing as money. From conversation with practitioners who have been associated with older colleagues for prophylactic work, as well as from what I have heard from women graduates who are willing to devote their time to such work, I am convinced that the matter of retaining satisfactory graduate assistants to do this work is simply one of dollars and cents in most cases, and if it could be adjusted on a more equitable financial basis, such as is customary in the business world generally, we should hear less of the difficulty of retaining graduate assistants. The average business man would consider a profit of from 20 to 50 per cent. a very good one in his business, including the investment in salaries or wages. The average dentist, when taking unto himself an assistant, is very apt to think that he has been poorly treated if his investment in the salary, commissions, and running expenses of such an assistant does not show a profit of from 100 to 500 per cent., without taking into consideration the hard work of which such an assistant relieves him by doing much of his laboratory work, and the greater leisure and added prestige which he obtains for himself by having a trained dentist at his elbow at all times. The dentist who employs an assistant does not do so generally until he is forced to it in order to do justice to his increased business, or because he needs a vacation occasionally. He should therefore be willing to give such assistant a salary or compensation worthy of a professional man who has spent three of the best years of his life in studying dentistry.

Another writer would limit the work of this prophylactic assistant to keeping the teeth clean by means of simple scaling of salivary deposits and polishing. It seems to me that if the work to be done by these assistants is to consist merely of removing superficial calculus and polishing the crowns of teeth, we are not justified in giving them the dignified title of nurse. They would be simply tooth-cleaners or tooth-polishers, and a better name for them would be denticure. If we are to have real trained nurses worthy of the name, who would have the same relation to our specialty as the medical nurse bears to general medicine and surgery, it would be necessary to give them a course of training in all branches of operative, therapeutic, and prophylactic dentistry, so that they could minister to the needs of patients in a manner analogous to that of the trained medical nurse. This would include not only scaling and polishing the teeth, but also medication and massage of the gums during the treatment of pyorrhea and other diseases of the mucous membranes, injecting the gums with local anesthetics preparatory to extractions, giving general anesthetics, changing dressings in teeth and sealing them in with cements and gutta-percha, and otherwise preparing patients for operations by the dental surgeon. It is probable that many of these ministrations would be performed anyhow, once we license non-graduates; it would therefore be better to make sure that they knew how, before permitting them to work on patients. The medical course is one of four years; a registered trained medical nurse studies three years, taking up the theoretical as well as the practical sides of medical science and art. The dental course is one of three years, well crowded. Analogy would require that dental nurses worthy of the name should study at least two years before being given a license to practice.

I believe I am not exaggerating by contending that, from observations extending over the last ten years, not more than about ten per cent. of the dental profession are at this time qualified to practice even the operative side of prophylaxis. The number of dentists who can scale and polish a set of teeth and keep the mouths of their patients in a state of health comparable with those of the patients of such men as Dr. R. G. Hutchinson, Jr., and Dr. M. L. Rhein of New York, is wofully small. How, then, can dentists thus lacking teach others to do this work for them? Such teaching can only be done by those who have for years done this work for themselves with their own hands, and who have not delegated it to others to do it for them. To succeed in this work, men and women must be able to "see with their fingers." The proof of my argument lies in the fact that there are practitioners who call themselves "specialists in prophylaxis," which simply means that there are some who have become so expert in this work that other dentists send their patients to them for the scaling and polishing of teeth. I can sympathize with the necessity for specialists in orthodontia, in crown and bridge work, in pyorrhea, and in plate work; but the term specialist in prophylaxis is a reproach to the profession, if prophylaxis means now, or ever shall mean, anything more in dentistry than the mere scaling and polishing of the teeth. Every dentist who does any operation at the chair should consider himself a specialist in prophylaxis, whose honest effort and ambition it should be to make fillings, pyorrhea treatments, prosthetic work, and all oral diseases with their concomitant constitutional effects, things of the past.

I again take the liberty of making a quotation from still another champion of the dental nurse, who says:

> The polishing of the surfaces of the teeth is but a branch of prophylaxis. But what dentist wishes to spend all day in polishing teeth? I would give up dentistry if I had to do that. What is there in dentistry for a man of ability and intelligence if he is to spend all his life in polishing teeth? Yet, if these wonderful results are to be obtained, this polishing must be done.

The dentist who said this evidently believes that this indispensable part of our work, so uncongenial to him, should appeal to young women of refinement as a desirable vocation in life. I would call his attention to the fact that many dentists who recognize the true significance of prophylaxis, who practice it as a part of their professional work, and of whose ability as dentists in all departments of the art there is not the slightest doubt. do spend a large part of their lives scaling and polishing teeth; and they are just as enthusiastic over the results obtained and just as intensely interested in this most beneficial service to their patients as are those who prefer to do the purely mechanical work. Furthermore, the latter are mere mechanicians, whereas the former may justly be called physicians of the mouth.

Still another argument brought forward in favor of women doing this work in preference to men is that their sense of touch is more highly developed. It is claimed that the delicacy of touch and peculiar finger skill of women, as instanced in their embroidery and needlework, are just what is required to enable them much better than men "to follow the root under the gum with a keen instrument and to tell with certainty the condition of the surface of the cementum where it cannot be seen"—as a prominent dentist puts it. But I believe that equal delicacy of touch and peculiar finger skill can be developed by the male hand, combined with the greater strength and exact technique requisite for this work. Men have ever been pre-eminent in all the departments of art and of science which require a high degree of digital or manual skill, viz, in painting and sculpture, in ivory carving and the illumination of missals, in bookbinding and the hand-tooling of leather, and in the exact technique of microscopy, bacteriology, and surgery. That they have not been equally prominent in the field of embroidery, so often cited as an argument of woman's pre-eminence in delicacy of touch, is due perhaps to the fact that this has always been considered one of the domestic arts peculiar to women, from time immemorial, and too effeminate a labor for a man. But witness the work of such men as Dr. Norman Kingsley, painter, sculptor, engraver, carver in wood, and great dentist; of Williams of England, as well as the work of such eminent men in the field of pyorrhea and prophylaxis as Drs. Riggs, Goode, Younger, D. D. Smith, R. G. Hutchinson, Jr., and many others who have developed wonderful technical skill. Their work proves that men are decidedly well fitted by nature for the scaling and polishing of teeth. Women are only just beginning to do this work as it should be done, and there are only a very few indeed who have thus far demonstrated their strength and ability to do it. We have still to see and to compare their results with those of men of established reputation.

Another phase of this subject strikes me as being rather peculiar. It has been proposed that dentists themselves train these proposed dental nurses. Some of the warmest supporters of the dental nurse for private offices tell us plainly that they do not do this work of preventive dentistry themselves; have not, in fact, done it for years, but have it done for them by others whom they have trained. As this work is admittedly exceedingly difficult and exacting, requiring most careful technique, combined with the power to "see with the fingers," I would ask: How can a teacher impart a practical knowledge of the manipulations involved, if he himself has only a theoretical knowledge thereof? This is all that would remain to him after having had the work done for him by others for a number of years, and being himself lacking in practice. Such manipulations cannot be taught by word of mouth. I heartily agree with Dr. Hutchinson that perfection in the scaling and polishing of teeth is only attained at the price of long years of hard work and application, and also that no man can impart such knowledge and finger skill to another unless he himself actually does the work day in and day out, and unless the pupil has the necessary ability and enough enthusiasm for it.

There is one more argument that has been used by the champions of the dental nurse, and that is the cheapness of price at which this work of scaling and polishing could be done. If it is to be done cheaply by these assistants, the latter would soon control the whole field, and those dentists who are now doing it themselves would either have to give it up as unprofitable or engage a nurse. This would greatly curtail the incomes of many of the young practitioners, who look upon the scaling and polishing of the teeth as a very important item. I am radically opposed to the cheapening of any branch of our work. This kind of work is just as important and should be paid for at the same ratio as any other class of dental operation, and proper education of patients will bring it about.

Lest I be accused of lack of chivalry to the fair sex for combating the dental nurse, and of being desirous of keeping worthy young women out of an easy, genteel, and lucrative means of livelihood, I take the liberty of mentioning what one of our colleagues of that sex thinks on the subject. Dr. Grace Rogers Spalding writes in the *Dentists' Magazine* for June 1906, opposing Dr. Rhein's trained dental nurse and Dr. Wright's denticure, saying that in her opinion only a college graduate should perform this service, and that such graduate should moreover have taken a post-graduate course of instruction in order properly to fit herself for it. Thus, instead of only a few months of instruction, this woman dentist believes that more than the ordinary three years of dental school training and a degree are necessary. She says that the dental nurse does not and never can exist, because she would be incompetent to do actual work, and could never gain the confidence of patients so necessary to enforce the ordinary rules of oral hygiene essential for successful results. She is also in accord with others opposing the dental nurse when she states that so few dentists realize the importance of oral prophylaxis that they are unwilling to master its technique, and believe it useless to endeavor to comprehend its scope; hence they could never properly train an assistant in the technique nor inspire her with the spirit of enthusiasm so essential to its promotion.

I will not go into the legal aspect of this question very fully, as the dangers from this source were pointed out to us by Dr. W. G. Lewis of Brooklyn some time ago. Dr. Barrett, of the Massachusetts State Board of Registration in Dentistry, thinks that we might establish the need for the trained dental nurse for charity work and limit her field to this; and he asks—Who is seeking this legislation, the nurse or the dentist? When the medical nurse sought registration, she was an established fact, a living reality. He also thinks that there are hundreds of young men who are barely making a living in dentistry; plenty who have been examined and found fit to practice, but are not doing enough work to support themselves. Another member of that board, Dr. G. A. Maxfield, asks—"Can we neglect the interests of the public by letting down the bars, that the nurse employed by a few individual dentists may have privileges more than those allowed the medical nurse?"

Dr. Dowsley, of the same board, points out that there are in Massachusetts some 3500 registered dentists, and asks how many really need the dental nurse. After canvassing the state, he was told that dentists there did not need the nurse. He expresses the sentiment of the board when he says that the proposed measure to license dental nurses would not strengthen the dental law, but weaken it.

There is one more matter I wish to touch upon before closing, and that is, the second phase of the licensing of non-graduates which I mentioned at the outset. This is the true sociological side, the real humanitarian or philanthropic aspect of this question. It is the phase which concerns itself with the good of humanity, of which our dental-nurse champions now make so much. Their chief spokesman says:

> Dentistry, in its ideal conception of repair of diseased and broken-down structure and replacement of lost tissues, will always remain a luxury. Even with the poor understanding that we have today of the law of immunity, we realize that prophylaxis for the masses would be infinitely more valuable than the inferior tinkering which so many receive. Is there any other way in which the gospel of a clean mouth can be brought to the multitude of school children, to humanity at large?

I must disagree with the ideal of dentistry held up to us by the gentlemen whose words I have again taken the liberty of quoting—*i.e.* the patching of broken-down structure. It is evident that what he means by prophylaxis for the masses is simply the polishing of their teeth, since he inveighs so strongly against the tinkering with their teeth. But to anyone who has had any recent actual experience in public dental clinics, no matter whether connected with a public school, a charitable institution or a philanthropic foundation of any kind, it must be painfully evident that the amount of repair work actually needed to put the mouths of the children in our public schools and institutions in a comfortable and sanitary condition is great enough to employ the services of all the dentists a large part of the year. It is just some kind of tinkering to patch up broken-down tooth tissue that is sorely needed; and until it is done, all the polishing in the world will be practically wasted, since it would not stop the rampant caries that is actually progressing. Statistics show that at least 80 per cent. of the school children of the United States have dental caries. It has also been shown that not more than 20 per cent. of the population can be given adequate dental attention on account of the lack of a sufficient number of dentists. Hence, at least 65 per cent. of our school children are in crying need of repair work at this time, and will be for many years to come, in spite of all the tooth-polishing that can be done. I believe that out of the 750,000 school children of Greater New York not less than 450,000 need the dentist's care. What good will it do these children with mouths full of carious, aching teeth to have nurses who can do nothing more for them than to polish their teeth? I thoroughly agree with Dr. Doubleday of Cambridge, who said before the American Academy of Dental Science last January that "What we want in the public schools is young women who have been trained to do cement work." I would go a step farther, and say that what we need at this moment in our public schools and institutions is young men and young women who shall be licensed to practice dentistry under certain legal restrictions, and whose work shall be limited entirely to our public schools and other public institutions. They should be under the supervision of doctors of dental surgery, and should have taken a regular course of training equivalent to two years in our best dental colleges. Such licentiates, after having spent the necessary time in such public institutions—which time might be either two or three years—could then apply for examination at the college where they were trained, or at any other college, for the securing of a diploma of doctor of dental surgery; or this diploma might be granted to them by a duly qualified board of examiners. This would soon supply the great need for dental practitioners to do the work vitally necessary which now remains undone, and which would continue so, if we licensed only tooth-polishers.

Would the gentlemen who desire the dental nurse be willing that she be restricted to the dispensaries and public institutions? Would they be willing that she do the rescue work so necessary, instead of simply doing preventive work, which would have a very doubtful value if the former were not first attended to? If the work of oral hygiene in its public aspect is to go on to a successful issue, some such solution of the problem must be found. Or else men of the caliber of those who feel that the nurse is indispensable should devote more of their own time to such public work, and should themselves go into the schools and dispensaries to do that work; yet a response for volunteers among them for this purpose does not meet with a very hearty response. Our first requirement today is not tooth-polishers; it is dentists for the masses, sufficiently qualified to do the repair work needed, no matter whether they hold diplomas or not, since the amount of that work is so enormous. This is the kind of work which would prove of the very greatest benefit to humanity, and would be far more appreciated by humanity than the mere cleansing of teeth. The ignorant poor in our public schools and institutions care little at present about clean teeth, they must still be educated up to that. What they want and will appreciate are comfortable teeth and freedom from pain.

T. P. Hyatt, Brooklyn, N. Y. I am very much interested in this discussion, particularly in the remarks made by the last speaker. If my memory serves me rightly, I believe it would have been possible, in days gone by, when someone conceived the idea that the world was not flat but round, for anyone wanting to take the opposite side of that argument to write not only an essay, but a full volume, in fact a whole library with quotation upon quotation to sustain the view that the world was flat. We know today that there is a movement in the air for woman suffrage, and the so-called unbiased man can give us essays upon essays, volumes upon volumes of reasons to prevent women from having the right to vote, but I do not think anyone present believes that that is going to stop it. I believe there are many members present who some eighteen or twenty years ago heard me advocate public lecture work on oral hygiene. A number of my friends laughed at me, and some of them absolutely disagreed with me, but none of them took the trouble to write an essay on the subject or to look into it any farther; nevertheless, the education of the public in oral hygiene has become a fact, not only in this state but throughout the world. If those who ally themselves with the speakers against the dental nurse think that by the citation of books, volumes, or libraries they are going to stop this movement, they are mistaken. We should not spend our time in quoting what other men say against this movement; we should look at the issue fairly, fearlessly, liberally, and see how we can serve more people, what can be done promptly and ethically for the protection of the profession and for the laity at large. The time Dr. Voelker has spent in the preparation of his excellent discussion is wasted, and a man of his ability should stop antagonizing this movement. We need him in the line of construction and building-up, not for the quotation of by-gone ideas, even though Dr. Hutchinson is one of those whom he quoted. In this connection I may say that Dr. Hutchinson has changed his mind considerably in regard to this question. I would like to know the date of the letter from which Dr. Voelker quotes, because Dr. Hutchinson told me that he was in favor of the dental nurse. I am sure that Dr. Hutchinson feels as I do that this question is a serious one, and must be considered carefully, wisely, calmly, and judiciously, and without any feeling of antagonism.

Dr. R. OTTOLENGUI, New York. I never begrudge any speaker who receives applause, but I am very sorry that Dr. Voelker received so much applause, because it proved to me that he had succeeded in completely bemuddling the situation. I do not believe that you gentlemen could possibly have so unanimously applauded that discussion if you really understood this question of the trained dental nurse as it is, and not as it has been presented to you by Dr. Voelker. No one more admires Dr. Voelker than I for his literary ability, but I quite agree with the last speaker that he has taken the wrong view of this question, and is using energy that might better be employed in some other direction. Dr. Voelker in his presentation of this question reminds me somewhat of Frankenstein, who built a monster which afterward terrorized him. As a matter of fact, the nurse who is advocated by some of the men back of this movement—of whom I claim to be one—is not the kind of creature that has been described to you by Dr. Voelker; there is no question of women trying to take up the illegal practice of dentistry. Do you know of any competent surgeon who does not have the assistance of a trained medical nurse in his office? Do you know of any institution where surgery is practiced where they do not rely upon the medical nurse? Do we not proudly call ourselves dental surgeons? What we need in dentistry is the dental nurse for the dental surgeon. I believe I had the pleasure of being present at the graduation of the first class of medical nurses in this country in 1879, and I think at that time they graduated both men and women nurses. On that particular occasion about fifteen nurses of either sex were graduated, and today, thirty-odd years later, there is scarcely a hospital in the whole world that does not train these nurses, but the training of men for nurses has almost gone out of existence. We are now contending with the same problem. Men are no more willing to be trained to be assistants than women are to be dentists. A few women have made marked success as dentists, but these are exceptions, and Dr. Darby at one of our annual meetings pointed out the inherent reason for this. When a man takes up dentistry, he regards it as his life-work, and, if he gets married, he is more than ever compelled to practice his profession;

but when a woman takes up dentistry, with a few exceptions, she does it with the idea that she will give it up when she becomes married, and marriage takes her out of the profession. It is therefore out of the question to look for competent male office assistants, because any man who realizes that he can only be an assistant is lacking in ambition. Neither can we expect men to be satisfied to do prophylaxis work if they have gone through the curriculum of dentistry. The sum and substance of this problem, therefore, is not as has been stated to you, and I was very sorry to hear the speaker trying to ridicule the proposition by using such a word as denticure, and saying that the dental nurse would be on a plane with the manicure; if that were true then the medical nurse would be but a "medicure." He also speaks of licensing uneducated and inexperienced people. That is not the proposition at all; the dental nurse must be both educated and experienced before she is licensed. There must be a beginning in the solution of this question. The need of the dental nurse has already been demonstrated to you, and her assistance will be of great help to the dentist.

Suppose a practitioner has a dental nurse in his office, she would occupy the same position as his assistant. One danger that has been pointed out is the mixing up of the work of prophylaxis with the treatment of diseased conditions. Prophylaxis is preventive; the dental nurse is not supposed to treat pyorrhea, but conditions which predispose to pyorrhea. She should, however, have sufficient knowledge of diseased conditions so that when, in taking care of a presumably healthy mouth, she discovers disease she would bring it to our attention. That is the kind of nurse we need in our offices, and that is the kind of training that these dental nurses will have, and when they are properly educated and legally licensed, I am certain that there will be no danger to our professional status from allying ourselves with these women.

Dr. M. L. Rhein, New York. The report of the Committee on Practice is always an interesting one, and it has been unusually so this year. I was especially impressed with the manner in which the chairman referred to the subject that has received so much attention during the past year, viz, the criticism of dental work on account of the many septic conditions that are frequently left as a consequence of imperfect dentistry. The criticism of the great amount of diseased conditions that continually result from imperfect dentistry is well merited; yet I may say that these imperfections are due primarily to the inadequate fees for dental services. Dr. Voelker in his discussion said that the fee question was a sordid matter, and that he did not want to allude to it very much. Yet, if this question is of so great importance in this matter that it stands out as the one predominant factor, and if because of difficulty in obtaining proper remuneration bad dentistry is done, then this question of fees must be considered. There are thousands of people today suffering from diseases that they never would have but for the fact that bad dentistry is practiced. This was brought out forcibly in the report of the committee, and we cannot get away from this fee question. It is necessary for the professional man to at least make a livelihood for his family, and when it requires hours of service to retain a tooth in a healthy condition, it is a question as to whether he shall do his duty by the patient or whether he shall follow the example of the great multitude and sacrifice that duty because of his inability to obtain a price sufficient to make a livelihood. That is the situation in our profession today, and it is due, as I have said before, to the fact that the medical man, who will always be the guardian of the public health, is ignorant of the important influence that this maladministration of dental service has on the health at large, but when the time comes that the medical man's education is sufficiently broad for him to understand the importance of this work to the general health, that sort of dentistry will not be permitted.

The subject of the dental nurse has been brought out today in a most peculiar manner. Dr. Voelker has gone to the trouble, for some reason or other, of quoting at great length practically all I have written on this subject. I do not know what reason he had for refraining from using my name in these quotations, except that he did not want to advertise me in so public a manner; but I want to say that, since he has quoted me at such great length, I most seriously object to having my ideas and my motives misunderstood and confounded. In one of his quotations he speaks of the different reasons I gave for various practitioners opposing the dental nurse, and then states that in this category we must include Professor Hoff of Ann Arbor. It was fortunate for me that I happened to return to the room in time to hear this particular sentence, because if there is a man practicing dentistry in this country or any other whom I respect it is Professor Hoff of Ann Arbor, and I resent any such attempt on the part of Dr. Voelker to impute to me motives that were foreign to my thought. In the reasons that I gave for practitioners opposing the dental nurse, I had no reference to certain members of the profession, but if Dr. Voelker chooses to take that quotation for himself, he is at liberty to do so. When I am ready to criticize or put into that opposite category any man, I do not lack the courage to express myself freely.

In regard to Dr. Hoff's and my own ideas and opinions on this subject, I have had many hours of personal discussion with him, and our differences are theoretically pure and simple, and I might say that, notwithstanding the paper he read at Buffalo, at the close Professor Hoff, with his usual candor, admitted at least the present necessity of the dental nurse so that practically he now stands for the dental nurse. The crucial point of this question resolves itself into whether we are professional men or whether we are playing at being professional men; whether we are members of a trade union trying to safeguard our own interests or whether we stand out as representing a branch of the healing art? Disregarding any personal feeling, I would consider myself debased if I discuss this question from any personal attitude. I look upon it in its broad sense. We are here, if we are professional men, with the welfare of the oral organs of the world uppermost in our minds. Not alone those patients whose teeth and mouths are intrusted to our care, but the entire world are looking to us, and our problem is how we can make the mouths and teeth of future generations better than they are at the present time. The dental nurse was never intended to practice dentistry; her work I have always insisted upon comparing with that of the medical nurse. She is to be trained and educated in such a way that she will have a fair comprehension of physiological and pathological conditions in the mouth, so that she may be a reliable assistant to the practicing dentist in every way, and she may carefully and skilfully remove the gross dirt and filth that surrounds the teeth above the gingivæ—not below. These nurses were to put the mouth in a clean condition in the same way as the medical nurse puts the patient in a clean condition prior to operative measures. The aim of Dr. Hyatt and others has been to put the functions of the dental nurse on a legal basis. One would imagine from the diatribe of Dr. Voelker that you could stop a trained nurse from doing the prophylactic work which I have described. It is perfectly legal for the medical nurse to do this. Why, therefore, should we not strive to place this service on a high plane, even though we differ in the estimation of its value; why should we try to interfere with its elevation to its highest point of value?

Dr. Hamlet (closing the discussion). Unless the associate members of the committee wish to say something, I shall be glad to allow the subject to pass.

Dr. Tracy. I have nothing to say except to answer the question as to the resistance of the fused porcelain inlay to physical and chemical tests. I have demonstrated to my own satisfaction that the fused porcelain stands the physical tests, but not the chemical ones.

The next order of business as announced by the President was the reading of a paper by Dr. A. W. Thornton, Toronto, Canada, entitled "Failures in Crown and Bridge Work: Their Cause and Cure."

After the discussion of Dr. Thornton's paper,

The Law Committee, chairman, Dr. WM. CARR, presented its report.

Adjourned until 8 P.M.

(To be continued.)

CONNECTICUT STATE DENTAL ASSOCIATION.

Forty-eighth Annual Convention, held at Bridgeport, Conn., April 16 and 17, 1912.

TUESDAY—*Morning Session.*

THE forty-eighth annual meeting of the Connecticut State Dental Association was called to order at 10.30 o'clock, Tuesday morning, April 16, 1912, by the president, Dr. R. H. Strang, Bridgeport, in the Hotel Stratfield ballroom.

The first order of business was the reading of the minutes of the last meeting, which was, on motion, dispensed with, because of the fact that they had been published in book form and sent to each member of the association.

Dr. A. C. FONES, Bridgeport. It has been customary in years past to present the president of the society with a gavel at the end of the session, thereby depriving him of the use of the gavel during the sessions. This year, however, it has been deemed wise to present the gavel at the opening of the sessions, in order that the president may have use of it during the meeting, and I therefore have pleasure in presenting to him this gavel, with the wish that he may use it judiciously during his tenure of office.

Dr. STRANG. I wish to thank you, Dr. Fones, and the members of the society for this gavel, and to say that I trust that whatever action may be taken while this gavel is in use will be for the best interests of the association and for the advancement of our profession.

I sincerely thank you.

The next order of business was the report of the treasurer, Dr. C. H. RIGGS, Hartford, Conn.

Motion was made and carried that the report of the treasurer be accepted.

The Executive Committee, through the chairman, Dr. G. B. PALMER, reported that they had examined the books of both the treasurer and the secretary, and had found them in excellent condition.

Motion made and carried that the report be accepted and approved.

The next order of business was the report of the Legislative Committee, through the chairman, Dr. Fones.

Dr. A. C. FONES reported that the principal activities of the Legislative Committee since the previous meeting had been toward preventing the passage of a special act of legislature granting licenses to practice dentistry to the registered assistants. There are at present forty-one men registered as assistants, and these desire to have a bill passed to license them to practice dentistry without their passing the examinations of the state examining board. Dr. Fones reported that, since these men had been extended the privilege of going before the board for license to practice, twenty of the original number of sixty-four had passed the examinations, and had been granted licenses to practice; one had been granted legal right, and two had died, leaving at present forty-one registered assistants. The Legislative Committee had thus far prevented the passage of such legislation, but had met with some very strong opposition. The chairman said that the fight would be continued, as he was sure that another effort would be made to pass such legislation at the next session. He asked for the co-operation of the members of the society in defeating such legislation, and also asked that the society appropriate $250, to defray the expenses of the committee in its work.

Motion was made and carried that the report of the chairman of the Legislative Committee be approved.

Motion was then made and carried that the society appropriate $250 for the use of the Legislative Committee during the coming year.

The next order of business was the report of the Committee on Membership, Dr. O. T. Rule, chairman.

Dr. E. R. Bryant, New Haven, moved that the report be accepted, and that the society extend to Dr. Rule a hearty vote of thanks for his efficient work in this direction. (Motion carried.)

The Board of Censors then reported the list of applications for membership, all having been approved by the board.

Dr. G. O. McLean, Hartford, moved that the secretary be instructed to cast one ballot favorable to the election of the entire list of applicants for membership in the society. (Motion carried.)

The president, Dr. Strang, then appointed as the Nominating Committee, to nominate officers for the coming year, the following: Dr. W. O. Beecher, Waterbury; Dr. F. W. Brown, New Haven; Dr. F. T. Murlless, Jr., and Dr. F. Hindsley, alternate.

Motion was then made and carried to adjourn until the afternoon session, 2.30 o'clock.

Afternoon Session.

The meeting was called to order on Tuesday afternoon, April 16th, at 2.30 o'clock, by the president, Dr. Strang.

Dr. Strang introduced Hon. Clifford B. Wilson, mayor of Bridgeport, who welcomed the association to Bridgeport.

Dr. James McManus read a sketch of the life of Dr. Emeline Jones, wife of Dr. Daniel Jones of New Haven, who had been a member of the Connecticut Dental Society since 1861 or 1862, and moved that the society honor her by electing her an honorary member of the Connecticut State Dental Association.

The motion was unanimously carried, and Dr. Emeline Jones was declared elected to honorary membership in the society.

The President announced as the next order of business for the afternoon session a paper entitled "Nitrous Oxid and Oxygen as a General Anesthetic, and Its Use in Dentistry," by Dr. Chas. K. Teter, Cleveland, Ohio.

[This paper is printed in full at page 895 of the present issue of the Cosmos.]

Discussion.

Dr. J. T. Gwathmey, New York. I want to congratulate the members of the society and also Dr. Teter upon the most excellent paper which he has just read. It certainly could not be clearer in regard to the general principles of anesthesia, also in regard to the special technique to be employed by the dentist in analgesic work. Dr. Teter deserves special credit for seizing and taking advantage of everything known in science, collecting data and embodying them in an apparatus. These principles are rebreathing, positive pressure, and the warming of the vapors, all of which have been of great value in all cases where they have been used. In no other apparatus that I know of have these features been taken advantage of so well as in his. I am under no obligation to state these facts, but in my opinion we should not wait until a man dies, before we give him credit for his work. In regard to the proper administration of anesthetics, I think every practitioner who administers anesthetics, as Dr. Teter does in a large number of cases, should be compelled to undergo as efficient training as he has had. The most practical way to obtain this knowledge is to study the effects of anesthetics in a laboratory where experiments in anesthetizing animals are carried out. It would be safer for the patients and better for the anesthetist to learn the principles of anesthesia in this way, and then apply that knowledge with courage and confidence in practical work. It is not an easy matter, for instance, to keep a cat or a dog under the influence of nitrous oxid and oxygen, for one or two hours, and if a person can keep an animal anesthetized for that length of time, he can do the same in a human being. In regard to aged persons, we must be careful not to increase the pressure too much, on account of the condition of the arteries. While it is not so necessary in dental work as in surgical work, yet it is wise to maintain a clear, bright color whenever possible, thereby eliminating danger. When positive pressure is used, there is no danger as long as there is no cyanosis.

Dr. Teter has mentioned the difference in the effects of warm and cold anesthetics, and it is generally agreed that he was one of the first to apply that principle in an apparatus. It is almost impossible to kill an animal in the laboratory with warm nitrous oxid and oxygen; with the cold anesthetic it is easy. The warmed gases may be administered for thirty minutes, and when the inhaler is taken away the animal will recover more readily than if the cold gases had been used. Dentists who give anesthetics only occasionally should take every precaution to avoid fatalities, and warm gases are an important factor of safety. Of course this warming of the gases is not as important in dental surgery as it is in general surgery, yet there is nothing so disagreeable and alarming, nothing that will destroy a dentist's practice as quickly as the occurrence of an avoidable accident. While such a case may not be reported, still an underground current travels from one practitioner's office to that of others, and quickly competitors as well as patients will be informed. Someone has truly said that there is probably more falsehood in the statistics on anesthetics than in any other records of medicine and surgery, for the reason that, when an operator has a fatality, he is not very anxious to blaze it abroad, as he might be in other cases of failure. At the same time we cannot ignore statistics. We know that the only danger in nitrous oxid and oxygen anesthesia consists in asphyxia, and by careful differentiation between asphyxia and anesthesia, that element of danger can be eliminated. As Dr. Teter has remarked, the operator is sufficiently forewarned as to syncope. When syncope occurs, the danger line is reached, but by increasing the oxygen or taking the mask off temporarily, danger is avoided. It is not so easy, however, even to asphyxiate a patient, provided the operator knows the symptoms. Animals can be asphyxiated to such an extent that the tongue will turn black, yet, when the mask is taken off at that time, they will usually recover. For that reason many dentists think it necessary to asphyxiate a patient for extractions, especially dentists who are not accustomed to the combination of nitrous oxid and oxygen. I had an experience some time ago which surprised me as to the knowledge of the average dentist in regard to this phase of anesthesia. I was called out of the city to give an anesthetic to a patient in whom gas had been employed on a previous occasion, and the symptoms at that time were so alarming that the parents of the child wanted a physician to administer the anesthetic when a second operation was required. I anesthetized the patient three times before the dentist began his work, and he told me afterward that the reason why he did not operate at first was because he did not think the patient was anesthetized, his idea being that the patient should be black in the face. The third time I insisted that he commence work, as I should have to leave, and he was very much surprised that the patient did not struggle or cry out. I have seen Dr. Teter work, and I must say that he is a master, because his patients do not suffer.

It is unfortunate that a great many more dentists do not use these gases for analgesia in their work. In my opinion, after they have become acquainted with the difference between the anesthetic and the analgesic stages, many of them will adopt this technique. For the purpose of analgesia the patient never has to be thoroughly anesthetized nor does the operator require as much training for this purpose as he does for general anesthetic work. As Dr. Teter says, by gaining the confidence of the patient when placing the nasal inhaler and then allowing a constant flow of gas, all apprehension as well as actual physical suffering can readily be obliterated. The analgesic effect can be detected by talking to the patient; when the patient's replies are incoherent, he is near the anesthetic state, because with all anesthetics the higher mental faculties are abolished first. This analgesic stage, therefore, is quite distinct from anesthesia, and there is no reason why operators should not employ this method in work that involves much pain.

The principle of rebreathing anesthetics has been applied for a number of years, long before Dr. Henderson of Yale thought of it, or Dr. Gatch clinically proved it. But these investigators deserve credit for placing this method on a scientific basis, showing not only that rebreathing does not produce toxic effects but that many actual benefits are to be derived therefrom.

I agree with Dr. Teter that it is unfortunate that inexperienced internes are called upon to administer nitrous oxid and oxygen, and that this anesthetic is dangerous in the hands of the inexperienced. Only a little over a month ago I was informed by a New York surgeon that one of the internes, who graduated from and had taken special work in Johns Hopkins University, and who had seen Gatch work, was called upon to administer nitrous oxid and oxygen for a surgical case, and in less than ten minutes the patient was dead. The only reason for this accident was that this interne did not know the difference between asphyxia and anesthesia.

There is one point which Dr. Teter touched upon only incidentally, and that is the necessity for all dentists to understand and to use nitrous oxid and oxygen in their practices in preference to other anesthetics. This has been advocated from the time when nitrous oxid and oxygen was first generally introduced as an anesthetic in dentistry by Dr. Colton in New York city. We know that nitrous oxid and oxygen has no poisonous effect upon the heart or other organs. When a patient is asphyxiated, respiration ceases, but automatically begins again, if the anesthetic is stopped at that point. When using other anesthetics, as ethyl chlorid, which is sometimes advocated for dental work, in case of accident respiration cannot be restored because ethyl chlorid acts upon the heart as quickly as does chloroform. The statistics on the number of deaths due to ethyl chlorid and to nitrous oxid and oxygen seem to prove that no one is excusable for using ethyl chlorid when he can employ nitrous oxid and oxygen, especially in dental work, —and that, of course, applies to other anesthetics which contain ethyl chlorid.

In regard to minor surgical operations I differ from Dr. Teter, because many of the fatalities from anesthetics have occurred in minor surgical operations. The first death from chloroform ever reported, in a case of Dr. Simpson's, occurred in a minor surgical operation. An ingrowing toe-nail was to be removed, and the patient died in four or five minutes. One reason for such fatalities is that the patient is not as well prepared for minor as for major operations. Then, again, there is danger in patients who use alcohol, and in athletes, who are very muscular and are able to take a long deep breath and hold it through muscular contraction. Less difficulty will be encountered in these patients if they are allowed to take a drink of whiskey before coming to the office, or if they are given one-eighth or one-quarter grain of morphin half an hour before inducing anesthesia, when it will be found that the anesthetic works satisfactorily and easily.

Positive pressure, rebreathing, and equal flow of the gases, as Dr. Teter explained, are all wonderful helps. I have witnessed the work of other anesthetists in different localities with other apparatus, with and without positive pressure, and there is no question in my mind that we obtain better results when using positive pressure. This is obtained by distending the bags to the full limit of the netting inclosing the bags, and unless this is done, positive pressure is not obtained.

Dr. G. T. GREGG, Pittsburgh, Pa. While I fully agree with Dr. Teter's statements, I am more interested in the portion of his paper which deals with analgesia than with the surgical part.

No other contrivance opens greater opportunities to the dentist than nitrous oxid and oxygen, for filling teeth properly and for filling more teeth. In my long experience I have noted a large number of mouths that have never been properly taken care of, for the simple reason that the patient was not able to undergo the strain of having his teeth filled properly, and for the other reason that the dentist himself did not care to undergo the physical strain of the operation. I have seen a great number of teeth filled with cement and gutta-percha, the final operations having been put off from year to year in the vain hope that the teeth would not be so sensitive at the end of a few months. One of my first patients of this kind, some four years ago, was a young man of means who had always been attended by dentists, so that there was no excuse for his teeth being in poor condition. I inserted thirty fillings in his teeth, preparing each cavity and filling each tooth with the aid of nitrous oxid and oxygen. Whenever he returns to my office now, I use nitrous oxid and oxygen, without asking his consent, because I know he wants it, and that is the experience you will have in many patients if you adopt this practice.

While I am unable to express adequately my enthusiasm over this method, I wish I could impress upon you the importance of giving it a fair trial. Last week I had the pleasure of listening to a lecture on this subject by Terry of Cleveland, who is as enthusiastic as I am; in fact, I have never talked with an operator who has given this method a fair trial who is not enthusiastic. Lots of practitioners buy the apparatus and expect to be successful with it from the beginning; that, however, is more than can reasonably be expected. An operator must start with easy cases first, until he gets more confidence in himself.

In regard to technique, I might add a few points to Dr. Teter's remarks. I was very glad to hear him say that many dentists are taking up this method. Still it is a mystery to me why their number is not much greater. If they could only appreciate the load that it would take off their hands, they would not hesitate a moment. Hundreds of good fillings come out, because the cavities are not properly prepared, as the dentist has to cut into very sensitive tissue in order to secure anchorage. If the patient does not suffer pain, cavities can be prepared properly. There is nothing gained by waiting.

Dr. Teter spoke of getting the confidence of the patient. It is not necessary to waste a lot of time by asking and answering questions. The apparatus is put on the patient as a matter of fact, without much conversation and explanation. In cases of nervous patients, the operator should keep on talking low, or whistling, so that these patients can hear him. This will help to divert their minds; it is a great comfort to them to hear the operator and to know that they are conscious. The operator may ask them questions now and then, and even if they are not in condition to answer, they can see you and hear, which is a comfort to them, and insures calmness on such patients' part.

Arguments adverse to this practice have been advanced. Some operators say it requires too much time; others say it is necessary that patients feel pain in order to realize that something is being done for them, for which they are charged later. The argument in regard to time is untenable, because under nitrous oxid and oxygen half a dozen cavities can be excavated as against one without it. The patient is under no strain when under the influence of nitrous oxid and oxygen, and cavities can be prepared without delay. The argument about the necessity for the patient feeling pain is ridiculous. The surgeon might as well say that the patient must feel pain while his appendix is being removed.

The expense of the gases is not a considerable item. I would rather use the gases and not charge a cent than have to work without them. I have been asked by fellow practitioners whether it was a good investment to buy an apparatus and take up this work. While I am under no obligation to Dr. Teter or any firm that sells this apparatus, I would say that, if a practitioner thinks that he cannot afford to buy an outfit, it would be advisable for him to save in something else and secure an apparatus.

Dr. Teter said that it was seldom or never necessary to put a patient completely under the anesthetic when operating in sensitive cavities. I find sometimes that nervous, high-strung patients must be rendered practically unconscious. I have tested that out in these patients by touching the outside of a tooth with a bur, whereupon they would wince just as if the bur were revolving inside the tooth. In these patients anesthesia has to be carried farther to enable us to do our work.

I hope that more operators will become interested in this method, and I know that they will never regret taking it up.

Dr. A. C. **Fones**, Bridgeport, Conn. I too am an enthusiast over the use of nitrous oxid and oxygen, but I have been using this form of anesthesia merely in its first stage—the analgesic stage. Last August I secured Dr. Teter's apparatus and essayed to practice painless dentistry. My practice has been limited to operations in connection with prophylaxis, and to the preparation of cavities. The first one or two administrations were disappointing. My hopes had been very high, and at once they sank very low; but I soon realized that my technique was faulty. I studied Dr. Teter's and Dr. Gregg's articles very carefully and found that I had not been administering the oxygen in proper quantity. Then I started over again, and by commencing with a little nitrous oxid, and gradually putting up the indicator to two per cent., then to four per cent., sometimes even to six per cent., and watching the patient carefully, I soon obtained the desired results. Since then I have had but few cases in which the results were not satisfactory. Indeed, they have been so satisfactory to some patients that they have almost pleaded with me to administer the anesthetic to them even for cleaning their teeth. Any operator who becomes efficient in this work, as he should, will thereby honor Horace Wells, who opened the way for the painless practice of dentistry. All that is needed is a little confidence; the anesthetic is practically harmless, without any danger whatever, and with a proper apparatus any operator can rapidly acquire the proper technique. I have removed the alveolar plate while the patient was talking to me. She was bordering close to unconsciousness, but able to speak to me, and when she regained full consciousness she remembered the whole conversation. I have excavated four sensitive cavities, keeping the patient in an analgesic condition for forty minutes, and at no time during the operation was the patient unconscious. I agree with Dr. Gregg that there are times when we have to carry the patient into unconsciousness, but only for a few minutes. There are other patients, I believe, who are not so susceptible to nitrous oxid and oxygen as they are to chloroform; and chloroform is a satisfactory anesthetic in some cases for that little numbing stage that I find in nitrous oxid and oxygen. These are rare exceptions, however, and I believe that, out of five cases, four are suitable for nitrous oxid and oxygen.

I wish that every practitioner were sufficiently interested to try this method. The fifty dollars, or whatever the apparatus costs, is more than repaid in a month's time. I have one of the smaller-sized apparatus, which is adaptable for this work; possibly with a larger apparatus I could do better, but the one that I am using is eminently satisfactory. It is remarkable how in excruciatingly sensitive cavities, extending to the gingival margin, which can hardly be touched with an explorer without the patient wincing, during this analgesic stage the sensitive dentin can be removed with impunity, while the patient is conscious. I have been treating my patients, like Dr. Gregg, as though nitrous oxid and oxygen were a part of everyday dental practice, and as much a necessity as a special instrument. If patients object to it, I answer them in a courteous way, but insist on its use, and after they have had it once or twice they are enthusiastic over it. I am sure that after you have seen the clinics this afternoon, you will realize that there is such a thing as painless dentistry.

Dr. JAMES MCMANUS, Hartford. I wish to congratulate the dentists of the country, and especially the medical profession—which so long held Dr. Wells in disrepute, giving him no credit but insisting that his discovery and the agent he was using could not and did not place patients in an anesthetic condition so that serious operations could be performed painlessly—that they are now giving proper credit to Dr. Wells for his wonderful discovery.

It has been very pleasant to watch this development in the last few years, and how much more nitrous oxid is being used, and it has been especially pleasant to notice the success which Dr. Teter has attained in his demonstrations and his practical work.

Years ago, when I was asked to write a little history of anesthesia for the Connecticut Valley Dental Society, I took some pains to look into the subject, and in closing I remarked that the time would come when medical men would study the merits of nitrous oxid, and not only study it but attempt operations with it, as they would surely find out its value as an anesthetic—and it has, indeed, been used all over the world, almost in millions of cases, and with few bad results. It is all well enough to talk about ether and chloroform; these agents are proper to use when operations of a serious nature are to be performed, but on general principles I have always felt that it was very risky and wrong for the average dentist to attempt to administer ether or chloroform, while little risk is involved in the administration of nitrous oxid.

As I said before, it is a pleasure to note how successful Dr. Teter has been in this work, and to realize that after all these years, Dr. Wells is being duly honored for his great discovery. The respect of the community for his memory is increasing every day, and we all know now and believe that Dr. Wells was really and truly the discoverer of anesthesia.

Dr. C. F. ASH, Brooklyn. It would be interesting if Dr. Teter answered the question I have just had Dr. Gregg ask him, in regard to how many deaths he has had in administering nitrous oxid and oxygen. Only last week I had an apparatus installed, and began to use it last Wednesday. On the Saturday preceding I invited about ten gentlemen to a demonstration of the apparatus in my office, and we took Dr. Gwathmey's advice and "tried it on the dog"—I was the dog. I wanted to know all about this method, so I consented to be the victim.

Dr. Gregg's statement in regard to a great many people not having their carious teeth attended to simply because they are afraid to have the work done, or because the pain is so great that they would not tolerate it, is very true, and I am one of those people. I have teeth that have needed attention for five years, and on several occasions I have made an attempt to have them cared for, but the pain was so great that I could not stand it. I sat in the chair on Saturday and had two large cavities excavated. While this was being done, I felt a certain amount of pain, but nothing to compare with what I had suffered previously. I made up my mind that it was too much to expect that I would not feel any pain whatever, but what I did experience was slight as compared to my previous experience. To assure myself, however, that there was some virtue in nitrous oxid and oxygen, after the inhaler was removed, I asked Dr. Gillett to take an impression of the cavity, and fill it with a temporary filling, and the pain that I experienced during the insertion of that temporary filling was such that I would not undergo it again for any price. These cavities are still to be filled, but when the time comes I shall have nitrous oxid and oxygen administered to me.

Among other well-to-do patients, I have one who has been raised with a silver spoon in his mouth, and has been guarded against pain all his life, and who is most sensitive to the least pain. In addition to that I found that his teeth are very much like my own, that is, supersensitive, and you can imagine the trouble I had in preparing cavities for gold inlays in this case. This patient came to my office on last Thursday, and when I wiped out a buccal cavity in a lower first molar with a piece of cotton, the tooth proved to be so sensitive that he almost kicked the foot-rest off my chair. I gave him nitrous oxid and oxygen, prepared the cavity, took the impression, and filled the tooth temporarily with gutta-percha, and when the inhaler was taken off his face he asserted that he had experienced no pain. This example simply shows the possibilities of this method even in the hands of a greenhorn. The aid that it was to me in that one case is sufficient to stimulate me to continue this work, and I am convinced that it will be of great benefit to me in treating similar cases.

Dr. Gregg. Dr. Ash mentioned the drying out of cavities and the insertion of temporary fillings. These operations, we know, are sometimes as painful as the excavation of cavities. It is so easy to place the inhaler over the patient's face, and when ready to insert the filling, to have him take a few inhalations; he will then feel no pain when the cavity is being desiccated.

Dr. Teter (closing the discussion). I wish to thank the gentlemen for their splendid discussion of my paper. I appreciate very much the finding of any fault with any of my papers, or any part of my technique, because I am always open to suggestions. In this way I learn —for I do not think that I have reached the point where I cannot learn any more.

There is one point which was spoken of by Dr. Gregg that I would like to make clear. He understood me to say that it was never necessary to produce a state of unconsciousness. What I said was this: "A condition will soon be induced which resembles that of intoxication, accompanied by a numb feeling, which is not disagreeable, and during this condition the most sensitive tooth can be worked upon without producing any appreciable pain to the patient in the majority of cases." He probably got the idea that the production of unconsciousness was never necessary, from the following paragraph of my paper: "From my experience with this anesthetic I can say that there is no danger connected with this form of treatment, and the most nervous and diseased patient can take it without the least hesitation. It is understood, of course, that the patients are not to be carried to the unconscious state at any time, but are to be in control of all their mental faculties at times." In some cases that paragraph does not hold good, because there is always a certain amount of danger in anesthesia if the unconscious state is produced. The percentage of patients in whom it is necessary to produce unconsciousness depends upon the operator's technique and ability to gain the confidence of his patients. I should judge that from 90 to 95 per cent. of cases can be treated without inducing the unconscious state.

Some of the speakers have said that their remarks were made with no incentive to boost the apparatus bearing my name. I have no such incentive either. I have never yet received one cent from the sale of this apparatus, and never expect to receive any. I have no connection officially with the Teter Mfg. Co. What I do get out of it is that they work out new ideas for me without expense to myself, and I am satisfied to have someone work out new ideas and improvements in connection with my apparatus; for anyone who has had experience in this line of work knows that it costs a good deal to experiment.

One gentleman asked about the fatalities that I have had. I omitted that portion of my paper, because of its length, but the one fatality that I have experienced in this work is described in detail in the paper.

I hear all over the country the same remarks as have been made by some of the speakers as to the advantage of the use of nitrous oxid and oxygen in producing the analgesic state. Many operators ask me if it will pay them to instal an outfit for the administration of nitrous oxid and oxygen, and I invariably answer that it will. One practitioner told me that his annual income had increased three times simply owing to the use of nitrous oxid and oxygen in painless dentistry. This is the experience of many practitioners all over the country from whom I hear. The first cost of the apparatus does not amount to very much, and the actual cost of nitrous oxid and oxygen is very small. Patients who are not willing to pay, if they have simply explained to them the advantages of this method, will be willing to pay almost any price to obtain painless and efficient treatment.

The meeting was then declared adjourned until the evening session.

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Devoted to the Interests of the Profession.

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EDITORIAL DEPARTMENT.

ARE WE READY?

SOME twenty years ago a prominent editorial writer expressed the opinion that "dentistry is largely written out"—the implication being that the entire field had been exploited in our literature, that the subject-matter of dentistry was known, and that little or nothing remained for study and research to accomplish in strictly dental subjects. At the period when the above-quoted statement was made, Miller's work on the causation of dental caries had been published, the embryology of tooth formation had been pretty clearly worked out, and the technique of dental operative procedures was fairly satisfactory. Coming from a recognized authority in dental science and education, the idea that dentistry had reached the limit of its possibilities of advancement in the field of research was not without its effect both within and without the profession. To some within the profession it acted as a deterrent to further studious effort in the translation of the unknown into terms of the known, and created a feeling of narrowness and limitation of the dental field which was shared alike by members of the profession and by those outside its ranks who were ready to assume a critical attitude toward any tendency toward scientific advancement or professional attainment upon the part of the dental profession as a whole.

The utterance of the statement in question betrayed the narrowness of the conception behind it, and time has demonstrated its utter fallacy. No scientific advancement is ever the final word of truth in relation to a biological question. Miller's work on caries was a demonstration of the exact accordance of the carious process with the principles which underlie germ action in the causation of other types of disease, but this demonstration was but a first and fundamental step toward the solution of the broader and more practical phase of the same problem—namely, the prevention of the wholesale destruction of human teeth resulting from the widespread prevalence of caries. The demand for more knowledge in relation to the conditions which govern immunity and susceptibility to dental caries has stimulated investigation into the bacteriology of the oral cavity, the defensive forces of the organism in so far as they are concerned with the prevention of bacterial invasion of the dental and oral structures, the food habit, social, hygienic, racial and climatic influences that are presumably modifying factors in caries susceptibility. Investigation of these same factors in connection with pyorrheal destruction of the retentive dental tissues has been actively progressing, and the whole field of orthodontic study has opened up such a vista of possibilities as to practically justify the claim of its devotees for its recognition as a specialized field of dental activity. The oral hygiene movement now constitutes a department of dental work second in importance to no other phase of preventive medicine. The study of dental diseases and defects in their relations to mental efficiency and the reflex neuroses arising from the same sources is developing data that are attracting the serious consideration of educators, sanitarians, neurologists, alienists, and social economists in all civilized countries. In view of all that has taken place since it was said that the "dental profession is largely written out," it is somewhat nearer the truth to assert that it has only just begun to write.

The importance of this general advance relates not only to the thing itself, but in a very definite way the reflex of these new departments of activity upon the attitude of the dental profession toward their own calling is a matter of fundamental importance. Dentistry has passed out of its swaddling-clothes of mechanical craftsmanship into the fuller stature of professional attainment; it can no longer claim manual skill and mechanical achievement as its principal ideal, as the be-all and end-all of dental training, but it must regard these excellent and essential features of its educational scheme as means to ends, and not as ends in themselves. We have for years conducted our system of preparation for dental practice under the dominant note of manual dexterity and mechanical efficiency as the educational ideal of dentistry. The inadequacy of the old standard to meet the new and rapidly increasing demands for a broader biological training as well as a more thorough and exact scientific preparation for dental practice, has tended to modify the old dental curriculum by the addition here and there of a smattering of training in those subjects that are fundamental to the larger sphere of dental activity here referred to. This tinkering with the old three-years curriculum has been merely temporizing and is worse than useless as a practical solution of the educational difficulty. The rise and aggressively critical attitude of stomatology, which has sought to meet the new need by grafting itself on as an appendix to the medical profession, is in its essence a protest against the inadequacy of the standard dental curriculum and its dominant ideal to meet the educational demands of the present enlarged field of dental professional activity. Neither the present dental curriculum nor the device of adding specialized dental subjects to the medical curriculum are adequate solutions of the problem. What is needed is a new curriculum of study and training that will practically fit the student for the sphere of action that is now demanded of the dental practitioner; and before constructive work can be done in the creation of a curriculum adapted to modern needs, a reconstruction of dental ideals must be wrought out with respect to the position, meaning, and relative importance of the technical mechanical features of dental practice.

The public criticism of dental methods that has from time to time appeared in lay magazines is not by any means without justification, and has its origin in the fact that too often the mechanical *motif* is the only controlling factor in the work of a certain class of practitioners who regard the successful construction of a piece of dental mechanism as the only end to be attained, and are neglectful or regardless of the vital relations involved in the adaptation of the mechanism to the case. It is the domination of the mechanical ideal as an end in itself, and the failure to regard it as a means to an end, that produces the type of operation which is the demonstration of the unfitness of its author to practice dentistry or his right to the degree that he thinks he has earned.

Let it not be understood that the relegation of the mechanical ideal to a subordinate place in the dental curriculum means less perfect craftsmanship or less sympathetic regard for the ability to do the delicate and difficult work that dental mechanism necessitates; on the contrary, it means the highest attainable perfection in dental mechanics as in all other departments of the curriculum. But what is demanded is a square recognition of the fact that dental mechanics is a means to an end, and that end is the restoration of vital function. Until we practically realize both in our educational work and in our work as practitioners that the vital side of our problem is the dominant factor, we shall fall short of our true professional status and fail to meet the reasonable expectation of the general public as to our abilities and intelligence.

To meet the present demand the length of time now given to the training of the dental student is wholly inadequate. The course should be lengthened to four years. The time of the present course is overcrowded even with the details of technical procedures, leaving insufficient time for a thorough grounding in the problems of chemistry, physiology, anatomy, bacteriology, pathology, materia medica, therapeutics, orthodontia, oral surgery, etc., without which the practitioner becomes a mere empiric; and the time has arrived, in dentistry as it has in medicine, when the empiric can no longer be countenanced either by the public or by those of his own calling. Intelligence and skill in the practitioner have become sufficiently general for the public to demand these qualities in those who minister to its health needs, hence the empiric is quickly relegated to a subordinate place in the stress of professional competition.

But why do not the schools recognize and at once put into effective operation the enlarged system of training that will produce the more efficient practitioner that the public now demands? The answer is not far to seek. The demand must come from the dental profession itself, for until the dental profession is willing to give its moral support to an upward educational movement and refuses to support the present inadequate system, the schools, broadly speaking, cannot take an advance step beyond the standards which the profession sets for itself.

BIBLIOGRAPHICAL.

METALLURGY: A TEXT-BOOK FOR WORKERS IN THE METAL INDUSTRIES. By AD. FENCHEL, D.Sc., Lecturer on Metallurgy in the Academic and Master Courses of the Trade Board of Hamburg. Translated by H. J. MORRIS, L.D.S.Eng., Lecturer on Dental Mechanics, Sheffield University. Pp. 273, with 111 illustrations. London: Bale, Sons & Danielsson, Ltd.

The description given of this book by its author is "A Text-book for Manufacturers, Foremen, and Workers in the Metal Industries, with a Special Consideration of Dental Metallurgy."

The aim is laudable, but the attempt to cover a subject so vast in 254 pages of leaded "8-point" type has resulted in a sketchiness that materially affects the value of the work from both theoretical and practical standpoints. From a text-book we expect the orderly sequence and comprehensive treatment of the subject which we find in the standard works on metallurgy. Credit is due, however, to the author for the original researches embodied in the charts; and yet, if we bear in mind the author's declared aim, the utility of these charts, as well as that of other theoretical parts of the book, must depend upon an already acquired scientific knowledge which is seldom possessed by "manufacturers, foremen, and workers in the metal industries."

There are chapters on the internal structure of the pure metals, alloys of two metals, thermic analysis, microscopic examination of metals and alloys, etc., which by reason of their brevity are incomplete, and therefore not satisfying.

The best chapters are those on the "Physical Properties of Metals," "The Thermic Study of Metals and Alloys," "Electrolysis," and "Alloys of Metals."

Turning to the practical parts of the work, we find conclusions and suggestions at variance with practice which plainly indicate Dr. Fenchel's lack of practical experience. For example, under "Gold and Its Alloys" (page 113) he states: "The compound Au-Sn is characterized by the extraordinary drop in the melting-point of Au which takes place when tin is added to it." This is suggested as "worth trying in gold solders." Later in the same chapter the author says (page 114): "This compound has the property of being as brittle as glass," despite which observation he continues: "Au-Sn and its mixture with pure Au are well worth considering as casting gold for dental bridge work." Again, in the chapter on Tin, he says: "The peculiar property which tin has of making other metals brittle caused it to be known in the middle ages as 'diabolus metallorum,' or devil of metals!" Ignorance of the nature of tin alloy cannot, therefore, be pleaded, and Dr. Fenchel's suggestions on the use of tin in solders and in gold alloys for dental bridge work descend to the level of haphazard conjectures, based upon the low-fusing properties of tin alloys.

The giving of precedence, in the order of melting alloys, to the metals having the highest melting-points is at variance with present dental metallurgical practice—for, following the observations of Flagg upon this subject, the reverse of this process is used, and alloys so made show a minimum of loss, therefore a lower percentage of dissolved oxids; and if the work is done understandingly, it is not necessary nor is it desirable that the melting-point of the highest-melting metal contained shall be reached to form a perfect alloy. In making copper-tin bronzes, the 25 per cent. loss of tin in the process quoted by Dr. Fenchel clearly shows the result of the method of melting—the error of the precedence of the higher-melting copper content.

The inclusion of brass in "scientific" formulæ is past understanding, as percentages and ingredients vary in this alloy. Instead of brass, definite proportions of copper and zinc should be used.

The "Special Part" of the book consists of data on binary alloys, and the information here contained is a tribute to the extensive reading and research of the author. Exceptions must, however, be taken to many conclusions regarding dental amalgams, and also to the adverse criticism of the research work of Dr. G. V. Black in this branch of dental metallurgy which are to be found in Chapter XIII, "Mercury and Its Alloys." Both conclusions and criticism are based on the assumption that an amalgam must be a complete solution of alloy and mercury so that no free particles of alloy shall be present in the amalgam filling, lest various ruinous disturbances occur. This position cannot be sustained, for alloys having opposite qualities are more successful, and Dr. Black's conclusions as to the physical requirements for an alloy are unassailable. Dr. Black established physical standards, and left purely theoretical questions to others. In connection with Dr. Fenchel's criticism it is curious to note that in an open letter which appeared in the February 1910 issue of the DENTAL COSMOS, Fenchel administered a scientific castigation to Dr. Black for stating that gold and tin destroy each other. Yet on page 190 of his present work, in the chapter on "Gold Solders," Fenchel states that "badly made solders containing free tin will destroy the gold to be soldered."

A valuable feature of this book is the bibliography to be found on pages 255 to 267.

WM. W. ATKINSON.

Rubber Hand-Stamps and the Manipulation of India Rubber. By T. O'Connor Sloan. Pp. 175, illustrated. Price $1.00 net. New York: The Norman W. Henley Publishing Co., 1912.

This book includes what purports to be a description of the manipulation of vulcanizable rubber in the construction of artificial dentures, which, for the author's credit, should either have been omitted, or he should have called into requisition the services of someone more familiar with the subject to enlighten him upon its details before publishing what really amounts to a caricature of the method.

It is not, however, for the foregoing reason that we review the book, which in other respects is a most admirable product. It is a fundamental proposition that every workman should be thoroughly familiar with the material in which his art is expressed, and the use of vulcanizable rubber enters so largely into the requirements of the dental art that every dental practitioner should know all that is to be practically known on that subject. The work before us is filled with useful information within the range of the subject expressed in its title, and will be a most useful and suggestive handbook for reference by the dental laboratory workman. The fact that it contains much matter outside of the limits of dental technique will only serve to add to its interest, because practically every dentist is interested in the craftsmanship of his calling, and suggestions which the book contains for the multitudinous uses of the vulcanizable rubber will serve to stimulate inventiveness in the application of many of the methods described to the needs of dentistry or its collateral relationships.

We heartily commend the volume to all dental practitioners.

Dental Laws Condensed. (A Brief Guide to the Requirements of Dental Examiners from Applicants for a License to Practice Dentistry in the United States of America and Island Possessions, Canada and the Provinces, also the Leading Civilized Countries Throughout the World.) By Alphonso Irwin, D.D.S., Camden, N. J., Member American Medical Association, National Dental Association, etc. Pp. 147. Price $1.00; library edition, $1.50.

The want of a book of this sort has long been felt, and those who have been appealed to by dental practitioners for information regarding the legal obligations to be fulfilled in the country of their choice owe Dr. Irwin a debt of gratitude for the accurate, authoritative, and concise manner in which he covers the legal requirements for dental practice in any state or country, from Alabama to Zanzibar. The information embodied in this book is based on the reports of officials of some 130 countries, and any practitioner desirous to transfer himself to a state or country at home or abroad, with or without an examination before a board of dental examiners, will find the essentials of the legalities and formalities awaiting him—unless he desire to practice in French Guiana, the Bahamas, or Nicaragua, regarding the dental laws of which countries we have had inquiries that were promptly answered. This is said simply as a warning to the author as to inquiries possibly in store for him. The author's labors are doubly appreciated by those whom he has relieved in such an efficient way of rather troublesome work in the nature of interstate and international legal information regarding dental practice.

The typography and arrangement of this little volume are most pleasing.

REVIEW OF CURRENT DENTAL LITERATURE.

[*Schweizerische Vierteljahrsschrift fuer Zahnheilkunde*, Zurich, No. 4, 1911.]

TREATMENT OF FRACTURES OF THE MANDIBLE. By Dr. P. Preiswerk, Bâle.

Methods of treatment of fractures of the maxillæ have not been markedly improved upon within recent years, presumably owing to the diversity of the methods advocated and the multiplicity of cases, each of which requires special manipulation. The apparatus employed for maxillary fractures must fulfil the following requirements:

(1) It must retain the fragments in fixed position.

(2) Its application must not involve great technical differences.

(3) It must consist of a material that resists the influences of the oral fluids, both chemically and mechanically.

(4) Its wearing must not incommode the patient.

(5) It must not interfere with the hygiene of the mouth.

(6) After its application, the patient should be able to resume his masticatory functions.

(7) It must allow of easy removal after the healing of the fracture.

From the foregoing it is seen that the old rubber and most of the metal appliances are unsuitable; moreover they necessitate the taking of an exact impression of the whole jaw, which is difficult to obtain, especially if tumefaction has set in. The number of teeth present in the mouth plays an important part, especially for the fixation of Hammond's and Sauer's splints. None of the appliances in current use re-establish the masticatory function. The author therefore introduces his apparatus, which is applicable in jaws containing a fair number of teeth and consists of metal crowns and interdental swaged splints joined together by one buccal and one lingual horizontal bar.

This appliance in every respect fulfils the above-stated requirements. Its application in a typical case is described by the author as follows: The patient presented a fracture of the left side of the body of the mandible; the soft tissues about the second bicuspid and first molar were greatly inflamed. A partial impression of this region was taken with a partial impression tray. An interdental splint covering the left incisors and canine was swaged, also a cap for the first molar on the other side of the fracture. These two appliances were joined by a lingual and a buccal horizontal, rigid wire bar, one end of which was soldered to the molar crown while the other end fitted into a tube soldered to the splint. The appliance permits of reducing the fracture correctly, restoring normal articulation, and, being firmly cemented to the teeth, allows the patient to resume mastication without again dislocating the fragments.

For taking the impression the author recommends firmly holding a book under the jaw, which will considerably reduce the liability to dislocation of the fragments.

[*Lancet-Clinic*, Cincinnati, March 9, 1912.]

EXCESSIVE USE OF TOBACCO AS A COMPLICATING FACTOR IN ANESTHESIA. By Dr. F. H. McMechan.

The excessive use of tobacco as a complicating factor of anesthesia has been but occasionally considered in the literature on this subject, though Hewitt devotes some space to it in his text-book. The first case reported by the author of the present article presented no particular contra-indications to anesthesia in the history or examination, and narcosis was induced by drop ether. As this was taken very badly, chloroform was substituted, with no advantage. The operator was discommoded throughout the entire operation by persistent rigidity of the abdomen, while secretion of mucus was profuse and jaw-spasm pronounced. Upon later investigation it was found that the patient, a young man of about nineteen, of otherwise usual habits, was a cigaret fiend, and consumed enormous quantities of tobacco daily. Whether or not the tobacco habit concealed some pathological neurosis, it would be difficult to state, although the inference might be drawn. A second instance of excessive use of tobacco complicating anesthesia occurred in a patient in whom an internal urethrotomy was to be done under nitrous oxid and oxygen narcosis. The patient was a robust type of adult who for some years had been living in the tropics, where he had acquired a habit of using cigarets. In the administration of the anesthetic, a peculiarity of breathing immediately supervened, the patient taking the anesthetic in a manner exactly similar to the method of inhaling the smoke of a cigaret. He inhaled the nitrous oxid and oxygen, swallowed once, held the anesthetic in his lungs for an interminable length of time, and then slowly blew it out between closed lips. Whereas nitrous oxid and oxygen narcosis is inclined to quicken respiration, in this instance the patient did not inspire oftener than four times a minute. The anesthesia was very unsatisfactory, short in duration, with spasm of the jaw muscles and a tendency to opisthotonos, without any degree of cyanosis to account for the phenomena. The question was raised whether ethyl chlorid would not have been preferable in this case. Yet, if the patient would inhale the vapor of ethyl chlorid as he did the nitrous oxid and oxygen, the risk of the anesthesia would have been greatly enhanced owing to the length of time during which the patient held the anesthetic vapor in his lungs. As the ethyl chlorid would have been given by itself, the patient would have exhausted the oxygen in his lungs very rapidly, and would have inhaled an overdose of ethyl chlorid, resulting in syncope, in just the same manner in which alcoholics die under chloroform during respiratory arrest caused by muscular fixation of the chest.

With nitrous oxid and oxygen it was possible in this patient, owing to the use of an intrathoracic valve on the mask, to accomplish perflation of the lungs under pressure, resulting in an abolition of a very inconvenient reflex, while the presence of a continuous supply of oxygen with the anesthetic prevented any asphyxial complications or circulatory syncope.

[*Dental Record*, London, April 1912.]

THE USE OF VERTICAL TUBES IN ARCH EXPANSION. By H. C. Highton.

The use of vertical tubes in connection with the expansion of the arch is particularly efficient in cases where there is a crowded condition in the canine region. It is also a very useful device in moving out the bicuspids and molars, and can be used to obtain a rapid expansion of the deciduous teeth and to relieve the narrow arch which so commonly occurs in the mouths of children. The device consists of clamp bands attached to the permanent first molars or deciduous second molars, and a squeeze band on the permanent or deciduous canines. A vertical tube of about half the length of the ordinary horizontal tube is soldered to the external surface of the clamp band and the squeeze band on the canine, and a wire is soldered from the end of the extension of the thread on the internal surface of the clamp band to the lingual surface of the squeeze band, and made to touch the lingual surfaces of the bicuspids or first deciduous molars on either side. Two German-silver wire arches are then bent up, the first to extend from the vertical tube of the molar to the tube of the molar on the opposite side, the second from the tube of one canine to the other. These arches are bent up as follows: First a straight piece to fit in the tube, then a parallel band to a position above the highest point of the tube, then a slight bend downward; the wire is then curved around to the opposite side, where it is adapted in a similar manner. The arch from the molar tubes is allowed to rest just above the necks of the teeth, and that from the canines in a position just below this arch. The bands are cemented in position, and the arches inserted subsequently, the expansion being brought about by giving the arches a slight bend outward, and in addition, the vertical portions which fit into the tubes can also be given a slight outward bend. The spring of the arches enables them to be retained in position, and this attachment can be increased by allowing a portion of the wire to protrude from the tube and giving it a suggestion of a twist inward and filing it over slightly in that direction. The device can best be constructed by fitting the bands to the mouth, taking an impression, and then the tubes and arches can be fitted on a plaster cast. The device for the lower jaw is, of course, constructed in the reverse manner to that suggested for the upper arch.

I.

[*Den Norske Tandlaegeforenings Tidende*, Christiania, January 1912.]

A PULP AND DENTIN ANESTHETIC. BY E. SELMER-ANDERSSEN.

II.

[*Deutsche Zahnaerztliche Wochenschrift*, Berlin, April 20, 1912.]

THE NORWEGIAN PULP AND DENTIN ANESTHETIC. BY DR. H. C. GREVE, MUNICH.

I. Selmer-Anderssen recommends, after prolonged use in his practice, the pulp and dentin anesthetic compounded by Dr. C. Arnkvaern and Dr. P. Torgersen. He claims that this preparation, which is proprietary, of course, produces full local anesthesia without any destructive action whatever upon the dentin or pulp tissues. After inserting a dressing of this anesthetic and leaving it in the cavity for twenty-four hours, the most sensitive tooth can be excavated painlessly. The power of penetration of this agent is said to be very great, yet the drug seems to be absorbed by the pulp without any trouble, the vitality of the pulp returning to normal after some time. If used for devitalization of the pulp, the pain is almost imperceptible as compared with that produced by arsenous oxid dressings, the pulp remains elastic and undecomposed, and can subsequently be removed much more easily. The inventors state that this agent contains two alkaloids, viz, carpain hydrochlorid and paucin hydrochlorid, to which another constituent is admixed. It is emphasized that the agent contains no trace of arsenic or nervocidin.

II. How injudicious, even downright dangerous, it is for a dental practitioner to employ therapeutic agents the constituents of which are unknown to him is shown by Dr. Greve's report of a case of accidental pulp devitalization and severe pericementitis following the tentative use of the anesthetic recommended above. He further cites seven cases of pulpitis followed by spontaneous death of the pulps, reported by Dr. Petersen in *Tandlaegebladet* of March 16, 1912, and states that carpain hydrochlorid is an alkaloid of *carica papaya* that digests albumin and blood fibrin, dissolves diphtherial membranes and cancerous neoformations, and produces severe pain if applied to nerve-endings. The cell-destroying properties of this vegetable alkaloid thus being a proved fact, its action upon the dentin and pulp tissue cannot be but deleterious. Dr. Greve's article represents a strong argument for the application of standard drugs in dental therapeutics exclusive of proprietary preparations, the use of which is not only unscientific, but involves grave risks in regard to successful practice.

[*Journal of the American Medical Association*, Chicago, June 15, 1912.]

INFLUENCE OF THE TEETH UPON THE DEVELOPMENT OF THE SKULL. (EDITORIAL.)

It occasionally happens that physiologic forces which are active in the organism are not adequately recognized until some pathologic condition makes their normal presence suspected. The teeth are ordinarily looked on merely as organs for mastication exerting a purely local influence in the mouth, and unsuspected as agents whose proper development is of considerable significance for the growth of the entire skull. In the course of the development of the teeth within the jaws from their delicate beginnings as tooth-sacs until their final evolution into perfect dental organs they must inevitably be demanding more and more room, and accordingly be exerting a certain degree of tension or pressure on the parts within which they are growing. Does this expansion exert any directive influence on the development of the jaws as a whole, or is the evolution of the teeth merely a localized incident in the changing form of the jaws with the progress of age? The question is one which is amenable to experimental treatment. Dr. Lansberger of Berlin has watched the effects produced by the extirpation of the tooth-sacs of both the permanent and the deciduous teeth before they have developed sufficiently to exert any influence on their bony environment. In this way he was able to distinguish between the inherent growth impulse in the jaws themselves and the possible contribution of the teeth to the contour and enlargement of the bony parts.

Such extirpations of the tooth-sacs, made on young dogs, were always undertaken on one-half of the jaw, so that comparisons could be made with the side unoperated on. An entire year was allowed to elapse before the skulls were prepared for examination. The changes observed were typical and constant. The direction of growth in the jaw was always altered so that a twisted or one-sided effect difficult to describe adequately in words was obtained; there were also evidences of inadequate development in certain parts of the bony skull, and a marked hypertrophy of certain parts about the nostrils was prominently in evidence.

The "twist" in the upper jaw occasioned by the absence of growing teeth calls for some comment. With the lack of tension or pressure ordinarily exerted by the developing tooth-sacs on one side, nothing interferes to oppose the strain on the other side. A distortion of skeletal form ensues as a consequence. This does not make itself manifest on the lower jaw, because it is equalized by the movability of the attachments of this part.

The interference with the well-proportioned development of the skull as a whole—a distortion in the vertical direction of the half operated on and a spreading in a horizontal way of the side not operated on—points to influences on growth exerted far beyond the immediate locality of the teeth. This unanticipated interruption of perfect skull development as the result of imperfect organization of the teeth may have wider import for medical problems than appears at first glance. If, as Landsberger remarks, improper development of the teeth can influence the skull in a pathologic way, as these animal experiments clearly indicate, it is not beyond the bounds of reason to suppose that the brain function may also become involved more or less. Nervous upsets associated with the difficulties of dentition are not unknown in practice; and the apparent correlations between teeth and skull may have a bearing for both the psychiatrist and the rhinologist. Traction devices applied by dental surgeons in cases of defects in dental development are reputed to have improved both the mental and physical condition of children.

Perhaps we have in the past failed to recognize the importance of the growing teeth in lending appropriate stimulus to the correct anatomic development of the head. Stomatology must become an experimental science—something more than an odd-sounding name of vague import.

[*Revista Odontológica*, Bogotá, January 1912.]

RUBBER DAM, LIGATURES AND CLAMPS, AND INFECTION. By Dr. P. E. Herrán.

The author sounds an appropriate note of warning against the application of the rubber dam, ligatures, or clamps without previous sterilization of these appliances and of the cervix of the tooth or teeth to be isolated. The disastrous results of such carelessness are evident when it is considered that the most efficient means of defense of the bucco-dental organs against bacterial invasion consists in the integrity of the mucosa and the dental ligament. If a ligature slips toward the cervix of the tooth, the gingival tissue is easily torn or normal circulation is prevented by compression, setting up a condition most favorable to infection, especially if the field of operation and the appliances employed for isolating the teeth have not been carefully sterilized. In substantiation of his warning, Herrán cites four instructive cases of infection due to neglect of asepsis in putting on the rubber dam. He recommends disinfection of the rubber dam by immersion in a solution of alcohol and thymol or formol, 1: 2000, wiping the field of operation with the same solution applied on a pledget of absorbent cotton, and sterilization of the clamps or ligatures in the steam sterilizer.

[*La Province Dentaire*, Lyons, March 15, 1912.]

TREATMENT OF WHITE SPOTS IN THE ENAMEL. By Dr. M. J. Quintero and Dr. E. Chouvon.

The teeth of children and young persons frequently exhibit small white opaque spots in the superficial or deeper layers of the enamel. These enamel spots allow easy entrance to caries, and demand, therefore, the prophylactician's careful attention. They are probably due to trophic disturbances during the intrafollicular life of the teeth. The deep-seated spots, which are noted upon transillumination, are formed by enamel prisms of an index of light refraction different from that of the surrounding enamel, and of a different chemical composition.

The superficial enamel spots in incisors and canines are situated generally at the cervix of the tooth, and appear to have as their predisposing cause a faulty union between the enamel and the cementum. Bicuspids and molars exhibit these spots also in their intercuspal grooves and fissures. While protected upon the eruption of the tooth by Nasmyth's membrane, these spots after some time become exposed and begin to disintegrate, chemical and mechanical erosion, the bacteria of the mouth, constitutional weakness, poor drinking-water, and bad habits hastening this destructive process.

One form of treatment of these superficial enamel spots is purely mechanical. After the tooth has been carefully cleaned, these pseudo-cavities are ground out with an Arkansas stone, and polished with cuttle-fish disks followed by finely powdered pumice, until no trace of roughness can be discovered even with the finest explorer. A final polish is produced by a soft felt wheel charged with putty powder, which is a tin oxid. Careful massage of the gingivæ is applied at each sitting in order to stimulate circulation and nutrition.

The therapeutic treatment consists in prolonged rubbing of the white spot with equal parts of tincture of iodin and zinc chlorid, to be repeated twice a week for one month, then every two or three weeks for three or four months. Every evening, after carefully brushing the teeth, the patient should rub the affected teeth with a pledget of cotton saturated with milk of magnesia.

Another form of treatment consists in the application of silver nitrate upon the spots, and removing the black discoloration after one or two years with a paste consisting of pumice and potassium iodid.

In masticating surfaces of bicuspids and molars, the fissures are cleaned and excavated, desiccated with hot air, and wiped with silver nitrate, tepid water and alcohol in succession. After drying, the fissures and shallow cavities are filled with Ames oxyphosphate of copper cement, which becomes very hard. After this cement has been worn away, the enamel is found to have become homogeneous and hard. The brown discoloration can be polished out with one or two applications of pumice and potassium iodid. The cement may be removed from the fissures, and replaced by gold fillings, insuring the perfect preservation of the teeth.

[*La Odontología*, Madrid, February 1912.]

ULCEROUS STOMATITIS IN CHILDREN.

By Dr. B. Landete Vila.

Ulcerous stomatitis is of very frequent occurrence and easily recognized and prevented. It is due sometimes to Vincent's bacillus, which may be associated with other spirilli of the mouth, sometimes to microbes such as the staphylococcus or streptococcus; generally, however, it is of polymicrobic origin. It is upon the nature of its origin that the several degrees of severity of this disease depend. As predisposing causes are noted: lack of care and attention of the mouths of children, especially during the course of a serious disease such as smallpox, scarlet fever, or measles, during the period of convalescence from which diseases stomatitis is especially liable to make its appearance; hence, stomatitis is found most frequently in children of from three to six years of age. Nursing and edentulous children are not attacked, indicating that the teeth are the main portal of entrance. Underfed, rhachitic, and weakly children, those who live in unhealthy environments, lacking light and fresh air, within the accumulated filth of asylums, schools, penitentiaries, barracks, and ships, are subject to the epidemic form of this disease.

The ulcerations are found upon the inflamed and tumefied gums, especially in the region of the incisors and of carious teeth. The gums are painful and bleed easily, while pus is flowing from the ulcers, which together with the food débris form a false membrane of a dirty grayish yellow color and extremely fetid odor. The gums recede from the teeth, which become loose and fall out. This is sometimes followed by necrosis of the maxilla in the region of the lower incisors, the ulceration tending to invade the lower strata. The disease is accompanied by ptyalism, ganglionary infarction, difficult mastication and deglutition, in many cases by intense fever, followed in time by necrosis of the mandible or death from septicemia.

Treatment is prophylactic and curative. If proper care of the mouth is taken, especially in eruptive fevers, such as measles, there is little likelihood of the children becoming infected with stomatitis. The simple brushing of the teeth in the author's opinion is an efficacious prophylactic. By isolating the patient, disinfecting his eating and other utensils, clothes, etc., the danger of contagion is avoided.

The curative treatment consists in daily painting the ulcerated surfaces with a pledget of cotton saturated in a solution of equal parts of silver nitrate and carbolic acid, and in a mouth-wash with a base of saturated sodium perborate, 3:100, for rinsing and brushing. Two hundred grams of this mouth-wash may be prescribed, a teaspoonful to be added to a glass of water, and the mother to be instructed to cleanse the child's mouth despite bleeding and pain, even if a soft brush is used. The touching of the ulcerated surfaces with copper sulfate, zinc sulfate, calcium chlorid, lactic acid, and mouth-washes with a potassium chlorate, mercury bichlorid, thymol, phenol, or some other base that is so much recommended, cannot compete with the above recommended medication. Local applications of a 1:100 acid solution of "606," owing to the specific action of this agent upon the spirilli, have been tried with great success.

[*Revue Trimestrielle Belge de Stomatologie*, Antwerp, March 1912.]

TOOTHACHE DUE TO A PLUG OF EARWAX. BY DR. P. DEPIESSE, BRUSSELS.

Depiesse reports the case of a patient who had suffered for three years with pains, especially in the lower molar region, neuralgic in character and chronic in severity. The extraction of seven perfectly healthy teeth, leeching, and different mouth-washes, gargles, and salves had produced but very temporary relief. When the patient was seen by the author, the toothache was localized to the lower right second bicuspid. The upper and lower molars were missing, but the mouth was in good condition, the remaining teeth being healthy and exhibiting no caries, tartar, pyorrhea, etc. The pain seemed to radiate from the tooth mentioned over the whole head, especially toward the right side. He also complained of having felt pain sometimes in the region of the ear. Upon examining the external auditory meatus, a plug of wax was found to be obstructing this duct completely. Upon removal it proved to be about one and one-half centimeters in length. The patient, when seen a week later, stated that the pain had diminished in intensity and frequency. Upon renewed examination of the ear the tympanum was found to be normal, but a slight inflammation was noted in the meatus, which after a few days reached a severe and painful crisis, but disappeared, together with the toothache, upon washings with carbolized glycerin. While earache due to dental disease is of frequent occurrence, the reverse condition, so to speak, is more rarely observed. The prompt disappearance of the pain in the case observed, and a consideration of the relationship between the auditory and dental nerves, render this report plausible, and the patient's loss of sound teeth, due to the consulted dentists' inability or unwillingness to look beyond the oral cavity in making a diagnosis, was deplorable.

PERISCOPE.

Protecting Soft Tissues in Polishing Fillings or Grinding Natural Teeth.—When polishing a filling or using a stone in the mouth, a sterilized teaspoon can be used instead of a mirror to protect the soft tissues.—*Dental Brief.*

Glass-Stoppered Bottles for Volatile Substances.—When volatile substances are placed in glass-stoppered bottles, the ground portion of the stopper should be moistened with glycerin. This not only makes a more effective seal, but prevents the stopper from sticking.—*Dental Record.*

Preventing the Adhesion of Cement to Instruments.—After a quantity of the cement has been placed in the cavity, the instrument employed is dipped into the dry powder that has remained on the mixing slab, when the cement may be packed without adhering to the instrument.—*Hya-Yaka* per *Oral Health.*

Separating Plaster Models Without Separating Fluids.—Immediately upon removal from the mouth, the impression is immersed in cold water for from five minutes to whenever it is wanted. The model is poured in the usual way, no separating fluid being applied, and it will be found that the model does not adhere to the impression, but comes away clean.—J. MILLS, *Oral Health.*

Finishing Gold Inlays and Fillings.—From an ordinary ink-eraser a number of small disk wheels are cut out with a small brass tube sharpened at one open end, and mounted on small-headed mandrils. These disk wheels may be cut to a thin edge, and prove very effective in polishing out the grooves in sulci in occlusal surfaces of gold inlays and fillings.—*Dental Practice.*

Relieving Pain Due to Application of Formocresol.—The severe pain which frequently follows the application of formocresol, especially in multi-rooted teeth containing vital pulps or fragments thereof, is relieved by removing the formocresol dressing and neutralizing the formalin by ammonia water. This may also be applied in painful dressings of phenol compounds.—*Le Laboratoire et le Progrès Dentaire.*

Obtaining Smooth Palatal Surface in Vulcanite Dentures.—In order to prevent plaster from sticking to a rubber plate and to obtain a smooth palatal surface, the plaster model is coated with a layer of collodion mixed with powdered aluminum. In this way a smooth, metal-like surface is obtained on the model, to which the rubber does not adhere after vulcanizing.—*Schweizerische Vierteljahrsschrift fuer Zahnheilkunde.*

Restoring Clogged Carborundum Wheels.—In order to restore clogged carborundum wheels which have become dull and useless after polishing amalgam fillings, the wheels are immersed into a fifty per cent. nitric acid solution for two or three hours, and then transferred into a bath of concentrated sodium bicarbonate solution, in which they are left until the acid absorbed by the wheels has been neutralized.—*Revue Trimestrielle Belge de Stomatologie.*

Influence of Mastication on the Condition of the Teeth.—Investigations on the children in the town of Koetzling, in Bavaria, shows that of those who eat hard bread, the percentage with bad teeth was 6.9; of those who eat both hard and soft bread, 8.2; of those eating only soft bread, 10.5. In the town of Ihringen (Baden) the percentages before and after the introduction of soft bread were as follows: In 1894, when only hard bread was eaten, 12.4 per cent.; in 1897, just after soft bread had been introduced, 12.9 per cent.; and in 1901, when most of the bread consumed was soft, 20.9 per cent.—*Dental Record.*

Making Gold Foil Adhere to an Old Filling in Repairing.—The best procedure to make gold foil adhere to an old filling in repairing is as follows: The rubber dam is applied and the filling is carefully wiped with wet cotton, followed by sulfuric ether, in order to remove all traces of fat. The filling is then washed with alcohol and dried with hot air. No. 4 gold foil is well annealed, and, after the old filling has been roughened, the foil is brought into closest contact with the old filling by using the smallest serrated plugger under hand pressure. The new foil is then firmly condensed with the hand mallet. —*Archiv fuer Zahnheilkunde.*

Waste of Gold in Dental Laboratories.—It is surprising what a large amount of gold is used annually by dentists, but the weight of gold actually put out and otherwise recovered is considerably short of the amount purchased from the depots, or put into the pots by dentists themselves. Where does this waste go to? It is a fact that old disks and strips which are usually thrown away will yield a fair return; especially is this so if grease is used, which helps to retain the gold. Not long ago we treated a box about 5 inches square for 5 dwts. 21 grains; this is above the average, but others all yielded good returns.—E. J. GOODE, *Commonwealth Dental Review.*

Alcohol Lamp vs. Bunsen Burner.—Wherever gas is available, a Bunsen burner is far more convenient and much safer than an alcohol lamp on the bracket table. An electric gas-lighting arrangement is more convenient and safer than matches, and neither difficult nor expensive to instal or maintain. While primary batteries are somewhat troublesome when the gas-lighting arrangement comprises a number of burners and necessitates long lines of wire, they are very practical and easy to instal when the burners are few and close to the battery. Under such conditions, from four to six dry cells are usually satisfactory, and will last a long time if short-circuiting is avoided. The overturning of a lighted alcohol lamp into a patient's lap is an accident one cannot think of without a shudder—W. H. TRUEMAN, *Dental Brief.*

Hints for Setting-up Teeth in Plate Work.—The upper central incisors should be set on each side of the median line and nearly perpendicularly. Their positions forward or backward should be governed by the amount of artificial gum necessary to restore the proper contour of the face.

The laterals should be a trifle shorter than the centrals, and inclined so that their cutting edges point slightly toward the median line. The neck of the laterals should not be as prominent as that of the centrals; the canines should be set well out at the neck and inclined so that their cusps point toward the median line.

The six anterior teeth should form a segment of a circle; the bicuspids should set well in and form a straight line with the molars, although the last molar should be set a trifle out from the straight line.

The lingual cusps of the masticating teeth should always be prominent, to bring force inside the arch.—*Shikwa Gakuho.*

Hints on Treatment of Fractures of the Jaw.—(1) Early diagnosis and fixation is very important to the successful outcome of fractures of the jaw.

(2) There appears to be no universally satisfactory method of fixation, but the method of binding the jaws together seems to promise the best results in the majority of cases.

(3) The interdental splint is not all that its advocates have claimed for it, being unspeakably unsanitary and often extremely unreliable.

(4) The wiring of fractured ends together would seem to be unnecessarily harsh, and suitable only in special cases.

(5) The comparative comfort and the excellent results obtained are sufficient justification for immobilizing the jaw.

(6) The difficulty of obtaining nourishment after this procedure is over-estimated, and the average patient can go about his usual duties with comparative comfort, with no apparent physical deterioration during the healing process.

(7) The care of the teeth, especially of those contiguous to the fracture, is most important, as they are frequently sources of secondary infection.—D. M. GRAHAM, *Items of Interest.*

A Movable Free Dental Dispensary.—The success of the dental clinics established in the elementary schools of cities has been so marked as to awaken the desire for a similar institution in rural districts. Until now it has not been possible, however, to find a system which would meet the dental needs of the children in country schools.

After a thorough study of this question the writer feels convinced that the best solution of the problem is a dental surgery which can be moved from place to place. This is only possible by establishing the surgery on wheels. He, therefore, obtained very exact information from craftsmen, and constructed a dental surgery wagon of the following measurements: Length 21 feet, breadth about 8 feet, height from 7 to 8 feet. The interior is lighted by very large windows in front and back. There is room for two operating chairs, and in case of necessity two dentists can operate simultaneously. The use of such dental surgery wagons is recommended for every country where the state roads permit its transportation. In mountainous districts, a wagon of 15 feet length, with only one chair, would be indicated.

As these wagons can be heated, they may be employed in winter as well as in summer.

The price is not very high; in Germany, for instance, it cost £120, not including the dental outfit.

By this means dental service can be rendered in every country village without great expense.

Not only in the country, but also in cities a movable dental surgery would be a very useful institution. It is a fact that children whose school is situated too far from the dental surgery will soon relent in their zeal and stay away. These drawbacks can be eliminated by moving the surgery to the schools. In new school buildings, of course, rooms can be easily provided for the establishment of dental surgeries; but this is not possible in old buildings, and the best expedient in this case would be the dental surgery wagon.

These movable dental surgeries could be employed also in case of war. In recent years dentists have very often been called upon by medical men for the treatment of fractured jaw-bones, and in future wars no nation will do without the service of dentists. In that case, these wagons can be used also for the transportation of general surgical supplies and instruments.—GEO. SCHERER, *International Archives* (*Hyg. Com. F. D. I.*).

Refining Gold.—Most of the gold refining is done with chlorin gas. The dentist has a choice of two means—one by the wet method, the other by fire. When gold filings are contaminated by platinum, etc., an acid refining is necessary. The filings are put into solution with aqua regia, and the residues containing silver chlorid examined for grains of platinum, for this metal dissolves so much more slowly than others; the excess of nitric acid in the filtrate is then evaporated, and the gold precipitated with ferrous sulfate, and from the residual solution, after gold precipitation, the platinum may be thrown down with ammonium chlorid in the usual way. If, on the other hand, the gold is only contaminated by base metals, then the simpler and quicker means is to fuse the gold with a suitable oxidizing agent such as saltpeter; if by chance the gold has become brittle through the accidental admixture of a little zinc or lead, a very quick and effective method is to drop a pinch or two of powdered corrosive sublimate on to the surface of the gold when molten. This, however, must be done only in a suitable, closed furnace, owing to the serious danger of salivation by mercury fumes.—E. J. GOODE, *Commonwealth Dental Review.*

Bile-stained Teeth.—At a recent meeting of the Section for the Study of Diseases in Children, of the Royal Society of Medicine, Dr. H. Thursfield mentioned an instance of bile-stained teeth in a boy who had been jaundiced for several months after birth; he had also during the first week of life passed very black stools, and had a purulent discharge from the navel. The two lower central incisors, when erupted, were a vivid yellow tint, and had since become green. The tint varied considerably, being occasionally quite bright and at other times dull. Dr. F. Langmead also spoke of a corresponding case of bile-stained teeth. In this case the jaundice began between two and three weeks after birth, and persisted until the baby was one year and three months old. It was at first accompanied by enlargement of the liver and spleen, but this disappeared rapidly under treatment by gray powder. Apart from the conditions noted, the child's condition at the time was good, and there was nothing to suggest syphilis. All teeth when erupted were bright yellow in color and obviously pigmented by bile, but the color had now almost gone.—*British Dental Journal.*

Dental Disease and the Mind.—Upson, from a skiagraphic study of the dental conditions of some 350 to 400 patients suffering from mental aberration, is convinced that dental disease among defectives and the insane is often present in a causal relation.*

He gives detailed illustrative histories of seven patients, including three adults and four children, in whom recovery from attacks of insanity of various grades, delusions, or mere irritability and nervousness, was brought about by extraction of decayed or impacted teeth and amputation of abscessed roots. Skiagraphic study of the jaws is strongly advised in cases of obscure mental and nervous disorder, even the possession of thirty-two well-placed teeth being no indication that skiagraphs can be dispensed with. The more hopeless mental disorders of childhood and adolescence, viz, imbecility and dementia precox, are among those furnishing the most striking examples of prompt improvement and ultimate recovery through relief of dental lesions; the cases selected, however, should be characterized by aberration, not by extinction of mental power. Incorrigibles, nervous and sleepless children, as well as those with impulsions and obsessions, are well suited for dental therapy. Neither kind nor location of dental lesion determines the type of mental disturbance present, which may include not only mania, melancholia, and other emotional disorders, as well as mental and moral defect in children, but also dementia, as it occurs from adolescence to senility, and paranoid forms of insanity. Absence of pain, moreover, is no proof that a dental lesion is harmless; in fact, upon studying cases, it is evident that the mental and nervous symptoms usually either part company with pain or vary in inverse proportion with it.—*Monthly Cyclopedia and Medical Bulletin.*

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* See also "Insanity Caused by Painless Dental Disease," by H. S. Upson, DENTAL COSMOS, May 1910, p. 526.

Paraffin Treatment for Carborundum Wheels.—Carborundum wheels run more smoothly and, in dry grinding, whirl up less dust if dipped into molten paraffin for a few minutes, and then laid on paper, which absorbs the excess of paraffin and prevents the wheels from becoming slippery or disagreeable to the touch. Facings or artificial teeth can be ground with such wheels without the operator breathing half of the ground-off porcelain. These wheels, however, must not be allowed to run until red-hot; yet, owing to the paraffin treatment, they can easily be disinfected in some sterilizing solution.—*Artikulator* per *Schweizerische Vierteljahrsschrift fuer Zahnheilkunde.*

Restoration of Fractured Crown and Root.—Quite often are we confronted with fractured bicuspids and molars, more often the latter, where, because of frequent filling and perhaps faulty fillings, or caries, the force of mastication will fracture the crown of the tooth, and the fracture will be continued well into the root, below the border of the alveolus. It is often necessary to devitalize and remove the pulps of these teeth or perhaps treat for putrescent pulps. In these cases, it is a problem how to prevent medicaments from escaping through the fracture and irritating the soft tissues or the blood serum from seeping into the root-canals and interfering with the establishment of aseptic conditions. The employment of an ordinary clamp band without tubes, such as is used by the orthodontist, has been found to be a great help in saving these teeth. The band can be placed, and by gently tightening the nut the fractured parts of the tooth brought together. It is wise to take more than one sitting to do this, for the reason that the band may be found to stretch just enough to allow the fracture to open, so it should be tightened the second and third day a little. The treatment of roots can now be instituted, and the fracture sealed by working a very thin mixture of cement into the ragged edges, using a smooth broach. After the root-treatment has been completed and the apex has been sealed with chloro-percha, the entire pulp-chamber should be filled with cement to assist in the retention of the fracture. The clamp band may now be removed, and some form of band constructed to protect the crown.—W. C. FISHER, *Dental Summary.*

HINTS, QUERIES, AND COMMENTS.

CAUTION IN THE USE OF ALL-PORCELAIN OCCLUSAL SURFACES IN BRIDGE WORK.

A NOTE of warning should be sounded to the profession regarding the importance of perfect occlusion in prosthetic pieces.

The new departure brought about by the casting process has rendered it possible to make all-porcelain occlusal surfaces in a bridge of four or five teeth. The occlusal surfaces of gold such as were formerly employed were subject to gradual wear, so that the bridge became fairly comfortable after some use. With all-porcelain occlusal surfaces, however, which undergo no wear whatever, the rigidity of the piece, especially if posterior teeth are replaced by it, will surely cause peridental trouble in the abutment teeth unless the occlusion be absolutely perfect from the start—a fraction even of a millimeter sufficing to cause irritation.

GEO. E. STALLMAN,
1st Lieut. D. C., U. S. Army.

OBITUARY.

DR. GEORGE J. FRIEDRICHS.

DIED, at New Orleans, La., on May 31, 1912, in a streetcar accident, in his eighty-second year, GEORGE JOHN FRIEDRICHS, M.D., D.D.S.

In the passing of Dr. Friedrichs, who on May 31st was run down and killed by a streetcar, New Orleans has lost one of her most prominent citizens, whose accomplishments as a leader in his chosen profession brought him both national and international repute.

The deceased was born on August 11, 1830, in Ebermanstadt, Bavaria, as the son of Andrew Friedrichs and Margaret Lang Friedrichs, and attended the parochial school of his home town from the age of six until his family, in 1841, emigrated to America, settling in Quincy, Ill. Here, and in St. Louis, Mo., where his family removed later, he attended the public schools and served his dental apprenticeship under the direction of Dr. John S. Clark of St. Louis. In 1855 he was graduated from the Ohio College of Dental Surgery at Cincinnati, and subsequently moved to New Orleans, where, thanks to his particular qualifications and ability, as well as his studious application to the intricacies of his work, he soon developed a most lucrative practice. During the civil war the deceased was a lieutenant in a militia company that was part of the New Orleans' home guard.

In 1883 he graduated in medicine from the University of Louisiana, now Tulane University, but did not engage in the practice of his profession to any great extent. He was mainly inspired to acquire the degree of M.D. by the fact that the American Medical Association refused at that time to recognize dentists and to consider dentistry as a branch of medical science.

In 1855, Dr. Friedrichs was married to Miss Louise Natalie Gaiennie of New Orleans, who died in 1910, leaving four children, Dr. A. G. Friedrichs, dean of the dental department of Tulane University, George G. Friedrichs, a real estate operator, Carl C. Friedrichs, attorney at law and member of the state legislature, and Dr. E. D. Friedrichs, a dentist.

Dr. Friedrichs was deeply imbued with the German student's love of home and work, and his recreation was sought in his family life, in reading, studying, and experimenting. He was a great swimmer and an ardent hunter, loved young people and their society, and maintained his physical vigor and vivacity to a remarkable extent. His application to his profession long ago brought him recognition from all parts of the world. He was for many years a prolific contributor to dental literature, and did much to advance the progress of his profession. He received honors from practically all large dental societies and associations in this country and Europe. He was ex-first vice-president and acting president of the American Dental Association, charter member of the Southern Dental Association, member of the American Medical and the American Dental Associations, the Louisiana state medical and dental societies, the Orleans Parish Medical Society, honorary member of the American Dental Society of Europe, associate fellow of the American Academy of Dental Science of Boston, the Academy of Stomatology of New York, ex-president of the Louisiana State Dental Society, honorary member of the First and Second District Dental Societies of New York, honorary member of the Odontological Society of New York, and emeritus professor of operative dentistry of Tulane University.

The esteem and regard in which the dental fraternity held Dr. Friedrichs was eloquently manifested on the occasion of the celebration of the fiftieth anniversary of his graduation in dentistry, held in New Orleans on February 21, 1905, when a golden loving cup was presented to him.

Interment was made on June 1, 1912, the deceased's former dental *confrères* acting as pallbearers.

DR. SANDS J. BOWMAN.

Died, May 22, 1912, at his residence, 227 Ovington ave., Brooklyn, from dilatation of the heart, Dr. Sands J. Bowman, in the fiftieth year of his age.

Dr. Bowman was born June 14, 1862, near Poughkeepsie, N. Y. His parents were John M. and Catherine E. Bowman. His early education was obtained at the Albany high school, from which he was graduated in 1882. He began the study of dentistry in 1883, in the office of Dr. J. J. Mills, Poughkeepsie, N. Y., in which association he continued for two years, when he entered the New York College of Dentistry, from which institution he was graduated in the spring of 1887. He opened an office immediately thereafter in Glens Falls, N. Y.

Three years ago he removed to Brooklyn, and entered into partnership with his brother, Dr. A. M. Bowman, with offices at 417 56th st. Dr. Bowman was a member of the First and Second District Dental Societies of the State of New York.

In 1889 he married Miss Lena Freeman of Glens Falls, N. Y., who, with two sons and a daughter, survives him.

His remains were interred at the Friends' Cemetery at Clinton Corners, Dutchess County, N. Y., May 25, 1912.

DR. WILLIAM E. HOAG.

Died, in New York, N. Y., April 14, 1912, in his seventy-first year, Wm. E. Hoag, D.D.S., M.D.

Born at Center Sandwich, N. H., in 1841, Dr. Hoag came to New York in 1860, and took up the study of dentistry with his uncle, Dr. Chas. Miller. He married Miss Kempton, and to this union one son, Joseph Kempton Hoag, was born. Dr. Hoag's second wife was Miss Knowlton, and by his second marriage he had two daughters and a son, all of whom survive him.

In 1872 Dr. Hoag was graduated from the New York College of Dentistry. Later he became interested in medicine, and took the course at the College of Physicians and Surgeons, where he received his medical degree in 1875.

He was a member of the New York Odontological Society, the First District Dental Society of the State of New York, and the New York Institute of Stomatology. He enjoyed his affiliations with all these societies and was regular in attendance at their meetings.

A close friend of Dr. Hoag's, a fellow practitioner of dentistry, says of him as follows: "Dr. W. E. Hoag was a man of strict integrity; honest and truthful, unselfish, genial, and a true friend. He was a gentleman in every sense, upright in his dealings, and to be depended upon under all circumstances. He was a successful practitioner, and a very pleasant relationship evidently existed between him and his patients. He lived the allotted age of man, and had he conserved his health and strength would have lived still longer. In his life, as in his speech, he was pure and chaste."

At a meeting held May 28, 1912, the New York Odontological Society, after the reading of the above epitome of Dr. Hoag's career, unanimously passed the following expression of regret:

Whereas, through the death of Dr. Wm. E. Hoag this society loses one of its valued members; be it

Resolved, That a copy of this minute be spread upon the records of the Odontological Society, and that a copy also be sent to the family of the deceased.

Wm. Jarvis,
Harry W. Gillett,
Wm. D. Tracy.

"IN MEMORIAM" RESOLUTIONS.

Dr. Safford G. Perry.

The New York Odontological Society, at a meeting held May 28, 1912, unanimously passed the following preamble and resolutions:

As a charter member of the N. Y. Odontological Society, and as its president for three years, the name of Dr. Perry is closely woven into the history of this society. Always a believer in the usefulness of the dental society as an institution, he had given unselfishly of his time and energy to promote the interests of this organization from its inception to the time that its activities were discontinued in 1911. The prominent position occupied by the society and the international reputation it enjoyed as an organization that stood for all that was best in the science and art of dentistry was due largely to the loyal and untiring efforts of the member we now mourn. Several of his splendid essays were prepared for this society, presented at its meetings, and form a part of its archives. When the subject of discontinuing active work in the Odontological Society was under discussion, Dr. Perry expressed much regret that a society which had been so useful, and through which so much good had been done for the profession, should be disbanded. He urged that the members be not hasty in reaching a decision, and expressed the hope that the organization would maintain its integrity even though its active work were over.

Dr. Perry's gentle and kindly manner and his keen sense of justice made him a respected executive, as well as a popular member in the ranks. His sympathy with the young men in dentistry and his uniform courtesy and generosity in all his relations with them, had endeared him to hundreds who will always remember him with gratitude.

As a lecturer on the faculty of the dental department of the University of Pennsylvania he was always warmly welcomed by the students. His keen sense of humor and a ready wit made his lectures interesting and entertaining, as well as instructive, and his youthful spirit drew his hearers to him and made them feel that he was one of them.

Dr. Perry's essays on dental topics stand out pre-eminently as examples of scientific and literary attainment, and his other writings, including both prose and verse, give evidence of unusual gift and of much cultivation.

RESOLVED, That by the death of our beloved fellow member dentistry as a profession loses one of its most useful and respected men; that the dental profession in New York loses its best-beloved member, and that the New York Odontological Society mourns one of its most loyal and devoted adherents. It is further

RESOLVED, That this minute be spread upon the record book of the society, and that a copy be sent to the family of the late Dr. Perry.

WM. JARVIE,
HENRY W. GILLETT,
WM. D. TRACY.

Brief Necrology.

Dr. ABRAHAM WILLIAM LAKIN of Boonsboro, Md., on June 8, 1912, in his seventy-fifth year.

Dr. THOMAS JEFFERSON KING of Brooklyn, N. Y., on June 16, 1912, of paralysis, in his sixty-first year. Deceased was a graduate of the Philadelphia Dental College.

Dr. G. E. CLARK of Galesburg, Ill., on June 24, 1912, of paralysis of the heart, in his forty-second year. Deceased was a graduate of the Des Moines College of Dental Surgery.

Dr. NEWTON A. WILLIAMS of Valdosta, Ga., on June 7, 1912, of apoplexy, in his fifty-ninth year. Deceased was a graduate of the Department of Dentistry of the University of Tennessee, ex-president of the Georgia State Dental Association, and member of the Georgia State Board of Dental Examiners.

Dr. HOWARD REYNOLDS HARBISON of San Diego, Cal., on June 5, 1912, of paralysis of the heart, in his fifty-third year. Deceased was a graduate of the Pennsylvania College of Dental Surgery, president of the California State Board of Dental Examiners, ex-president of the Southern California and San Diego County Dental Associations, member of the California State, Southern California, and San Diego County Dental Associations.

DENTAL COLLEGE COMMENCEMENTS.

COLLEGE OF PHYSICIANS AND SURGEONS.

THE sixteenth annual commencement exercises of the College of Physicians and Surgeons were held in San Francisco, Cal., on June 6, 1912.

An oration was delivered by Rev. Wm. Rader.

The degree of Doctor of Dental Surgery was conferred on the following graduates:

Pedro S. Arcentales
Henry H. Caldwell
Raymond E. Doran
Ralph T. Duffee
Albertus G. Dunn
James Fleming
Henry L. Harris
E. Melvin Johnston
Thomas H. Kearns
Frederick E. Kelley
William B. Knights
Lloyd H. Kruschke
Charles E. Meagher
Karl W. Messner
William C. Reid
Louis W. Schmohl
Albert C. Schraft
Jackson H. Smith
Ivan R. Tremain
James F. White
George E. Wrigley

COLORADO COLLEGE OF DENTAL SURGERY.

THE annual commencement exercises of the Colorado College of Dental Surgery were held in Denver, Colo., on June 6, 1912.

The degree of Doctor of Dental Surgery was conferred on the following graduates:

William H. Baker
John W. Barnes
Daniel Bate
Samuel R. Beckley
Ernest W. Boyens
Archie B. Brusse
Adelbert B. Buck
George A. Bullard
Robert E. Buvens
Deane L. Chamberlain
David L. Cohen
William H. Fluallen
Edmund T. Glessner
Richard C. Greene
Kenneth Henderson
David B. Hill
Roy V. Hogue
George K. Inouye
Earle R. Little
Clarence O. McMillan
Harley R. Peterson
Fred W. Reiter
Stewart F. Richards
Joe A. Rosenburg
Leon Rubins
James H. Samuel
Ida Shapiro
Allen F. Templeton
Marcus H. Volk
Charles H. Watson
Alton O. Wilson
Thomas H. Wood

BALTIMORE MEDICAL COLLEGE, DENTAL DEPARTMENT.

THE thirty-first annual commencement exercises of the Baltimore Medical College, Dental Department, were held in Albaugh's Lyceum Theater, Baltimore, Md., June 4, 1912.

An address was delivered by James W. Cain, LL.D.

The degree of Doctor of Dental Surgery was conferred by Prof. S. K. Merrick, president, on the following graduates:

Bernhardt B. Burston	Massachusetts
Joseph A. Campagna	Massachusetts
James L. Canfield	Massachusetts
Arthur N. Carroll	New York
Joseph Christie	Massachusetts
Elmer O. Cleland	New York
Robert J. Collins	Connecticut
Denis J. Coyle, Jr.	Connecticut
William J. Driscoll	Connecticut
Morris Lebow	Rhode Island
William P. Mahoney	New York
Arthur G. Mongeau	Massachusetts
Matt McBrayer, Jr.	North Carolina
Arthur L. Perrault	Massachusetts
Francis J. Ragan	Connecticut
Paul R. Roulier	Massachusetts
John M. Schafer	New York
Howard E. Stine	Pennsylvania
Robert L. Strickland	New York
Charles R. Teague	North Carolina
Edgar L. Thibou	British West Indies
Leroy C. Thrasher	West Virginia
Herman B. Wood	New Brunswick

HOWARD UNIVERSITY, DENTAL DEPARTMENT.

The forty-third annual commencement exercises of the Howard University, Dental Department, were held in Washington, D. C., on June 5, 1912.

An address was delivered by Hon. Wm. H. Lewis, assistant U. S. attorney-general.

The degree of Doctor of Dental Surgery was conferred on the following graduates:

John N. Archambeau
Edgar S. Ballou
Samuel D. Calloway
John H. Cardwell
Samuel F. Coppage
Burrell B. DeHaven
Henry D. Dickenson
A. R. W. Ferebee
Antoine Graves, Jr.
Albert C. Johnson
William A. Jones
Dudley G. King
Leonard St.C. Kirton
Thomas W. McGill, Jr.
A. H. S. McIntosh
Jesse D. Moses
James D. Richey
Leonard F. Sarjeant
Russell M. Swayne
Edward H. Taborn
Robert M. Tribitt
Jesse E. Warren
Chas. H. Weeks
Walter W. Whitfield, Jr.
William H. Whitted
Joseph D. Wilson
Wilbert H. Wright

NEW YORK COLLEGE OF DENTISTRY.

The annual commencement exercises of the New York College of Dentistry were held in Carnegie Hall, New York, N. Y., on Monday, June 3, 1912.

An address to the graduates was delivered by Rev. John Wesley Hill, D.D.

The degree of Doctor of Dental Surgery was conferred by Rev. Geo. Alexander, D.D., on the following graduates:

Samuel Alexander	New York
Victor L. Arnet	New York
Le Roy T. Asche	New Jersey
Abraham Asen	New York
Joseph H. Barnett	New York
Robert J. Barrett	New Jersey
David Beilock	New York
Isidore S. Berger	New York
Herman L. Bielefeld	New York
Leon Bloch	New Jersey
Moses Blumenkranz	New York
Benjamin L. Brosseau	New York
Jacob S. Calman	New York
Maximilian Cohen	New York
Albert S. Cumming	New York
Jesse Feinberg	New York
Charles H. Feingold	New York
Alton L. Fisher	New Jersey
Jonas Fisher	New York
Jacob N. C. Fles	New Jersey
Samuel Fox	New York
Morris Frachtman	New York
Adolph Friedman	New York
Charles H. Garretson	New Jersey
Nathan Gassen	New York
Jacob Gerber	New York
William Ginsberg	New York
Frederick Ginsberg	New Jersey
Bernard Goldfield	New York
Louis Goldin	New York
Louis Goldstein	New York
Peter Goldstoff	New York
Abraham L. Grodjeski	New Jersey
Samuel H. Gross	New York
Herman Grubin	New Jersey
Herman Haas	New York
Leon Harris	New Jersey
Henry T. Hartman	New York
Charles W. Hlavac	New York
Cornelius M. Kaletsky	New York
Joseph H. Kauffmann	New York
Frank Kaufman	New York
Leonard Kohn	New York
Jacob Koppel	New York
Herbert U. Kuehne	New Jersey
Solomon Landsman	New York
Henry Lehrer	New York
Samuel Levine	New York
Alexander Lifshitz	New York
Frank K. Lyons	New York
William M. Manne	New York
William Mendelson	New York
Herman C. Offenbach	New York
Benjamin Paaswell	New York
Harold W. Pembleton	New York
Uriel Perlman	New York
Joseph W. Pinck	New Jersey
Max Polatschek	New York
Lawrence A. Purcell	New York
Herman D. Robinson	New York
Samuel Rubin	New York
Victor P. Salvatore	New York
Philip L. Salzberg	New York
Laurence I. Schwed	New York
Alexander Seldin	New York
Louis Shankroff	New York
Leo Stern	New York
Harry Teitelbaum	New York
Isaac Tolmach	New York
Morris D. Wallach	New York
Gilbert M. Weaver	New Jersey
Harry Weissman	New York
Louis H. Werner	New York
Wells W. Wilson	New York

COLLEGE OF DENTAL AND ORAL SURGERY OF NEW YORK.

THE annual commencement exercises of the College of Dental and Oral Surgery of New York were held in the auditorium of the Engineering Societies' building, in New York, N. Y., on May 27, 1912.

The valedictorian was Starr L. Beckwith-Ewell, D.D.S., and an address was delivered by George C. Peck, D.D.

The degree of Doctor of Dental Surgery was conferred by Mr. Clarkson Cowl, president of the board of trustees, on the following graduates:

Elizabeth R. Bauman
Starr L. Beckwith-Ewell
Howard F. Berkey
Leo V. Bickow
Joseph Z. Biegeleisen
Rose A. Bromberg
Abraham Chinich
Harold A. Curtis
Stella Eliowicz
Meyer C. Ellenstein
Samuel B. Englander
Hyman Fass
Isaac Gellman
Sarah H. Goodman
Thomas M. Hatton
Arthur J. Johnen
George B. Jolliffe
Francis B. Kelly
Jacob Korf
Bernard A. Lanset
Louis B. Lippman
Josephine E. Luhan
Marie F. MacElroy
Albert F. Müller
Gisela S. Nash
Theodore O. Peterson
Nathan A. Posner
Annett M. Ravitch
Jacob Reitman
Lena M. Robins
Charles Rosell
Daniel Rosovitch
Harold E. Roy
Clarence R. Salter
Louis Sapirstein
Nathan Shapiro
Annie Startz
Abraham Tananbaum
Henry A. Wahrman
Thomas C. Webb
Melanie Wolf

WESTERN DENTAL COLLEGE.

THE annual commencement exercises of the Western Dental College were held in the auditorium of the Central High School, Kansas City, Mo., on May 18, 1912.

The annual address was delivered by H. H. Holmes.

The degree of Doctor of Dental Surgery was conferred by the dean, D. J. McMillen, M.D., D.D.S., on the following graduates:

Wilbur M. Benefiel
Cecil H. Baker
George L. Bennett
Vernon A. Boucher
Floyd C. Carey
Herbert S. Calhoun
Royal F. Carter
Chester F. Ebling
Earl Q. Gast
L. Vernon Gast
Clarence C. Gill
Simpson E. Grow
Oscar W. Gruenwald
William T. Hastain
Wilfurth Hellman
S. Ada Harris
Arthur M. Hammen
U. Grant Hill
Robert E. House
Robert E. Henson
Otis B. James
Charles P. Johnson
Lee H. Johnson
Roy R. Johnson
Delbert Kelso
Kenneth C. Kyger
Chris D. Lau
Joseph M. Lininger
Russell J. McKeown
U. Sherman Miller
F. Agnew Murray
Eugene M. Pack
Charles F. Palenske
Oscar Q. Poynor
Alva E. Ricks
Edna A. Rinehart
William Sather
Hal A. Steffey
Morris E. Spence
R. Carr Stewart
Clyde D. Todd
Jesse R. Wallace
Luther A. White
William E. Wolff

UNIVERSITY OF SOUTHERN CALIFORNIA, DENTAL DEPARTMENT.

THE annual commencement exercises of the University of Southern California, Dental Department, were held on June 13, 1912, in Los Angeles, Cal.

An address was delivered by Rev. Charles F. Aked, D.D.

The degree of Doctor of Dental Surgery was conferred on the following graduates:

Earle W. Baumgardner
Reginald LaT. Caldwell
Ernest E. Cannon
Frank H. Cram
Harry B. Crawford
Leila C. Crew
Oliver W. Davies
Chester A. Day
Elmer H. Kelly
Homer D. Kirkpatrick
Richard C. Liggitt
Irwin D. Nokes
Alexander A. Payette
Thomas R. Peden
Claiborne W. Puckett
Enos C. Reid
Clinton DeW. Russell
P. Albert Sparks
Harry E. Straub
Cort L. Sutton
Grover C. Todd
Clarence B. Walker
Charles G. Wiggins
Frank A. Williams
John M. Wilson
Masaharu Yamaguchi

WESTERN RESERVE UNIVERSITY DENTAL SCHOOL.

The nineteenth annual commencement exercises of the Western Reserve University Dental School were held on June 13, 1912, in the Amasa Stone Memorial Church, Cleveland, Ohio.

An address was delivered by Rev. Geo. A. Gordon.

The degree of Doctor of Dental Surgery was conferred on the following graduates:

Theodore H. Aaron
Paul J. Aufderheid
Thomas M. Bailey
Harry H. Ball
Orlin T. Battles, Jr.
Lonzo G. Bean
Roy L. Bearss
Horace V. Bishop
John W. Bradley
Carl G. A. Busch
Herbert S. Cowles
Arthur J. Davis
James B. Finlayson
Joshua Flock
Louis A. Friedland
Demetros Gannos
Joseph W. Golding
Joseph E. Klein
Peter P. Lechner
Anthony J. Marlewski
James E. Matzinger
Charles R. O'Donnell
William R. Parsons
Erle M. Patchin
James H. Reid
Harry A. Reiman
Chester W. Richards
Bertram S. Rothwell
Leo Samuelson
Thomas J. Sullivan
Charles Taintor
Leonard J. Whelan
Charles M. Wright

UNIVERSITY OF PENNSYLVANIA, SCHOOL OF DENTISTRY.

The annual commencement exercises of the School of Dentistry, University of Pennsylvania, were held on June 19, 1912, in the Metropolitan Opera House, Philadelphia, Pa.

An address was delivered by Dr. Joseph Swain, president of Swarthmore College.

The degree of Doctor of Dental Surgery was conferred by the provost, Edgar F. Smith, Ph.D., Sc.D., LL.D., on the following graduates:

William R. Bailey
Edwin H. Bestic
Philip C. Brackett
Joseph A. Bray
Edgar Z. Briggs
Walter H. Broad
John D. Brown, Jr.
Louis J. Bruschera
Maurice Bury
Herbert W. Cairns
Hugo Caminha
Henry McC. Carter
Arthur I. Chapman
Guy B. Chapman
William F. Clarke
Hugh W. Close
Joseph M. Creegan
Arthur W. Crowly
Martin T. Cunningham
Edward G. Dolan
Edward J. Donehue
William H. Donovan
Donald M. Dougall
Burt A. Easton
Herbert Ellwood
De Forrest W. Ewing
LeRoy W. Farley
James C. Finlay
Willard A. Fosdick
Herman N. Foster
Austin C. Frank
Raymond E. Frey
Edmond G. Friederich
Joseph E. Gabriel
Arvy A. Garfat
Gustave A. Gonard
John J. Gorman
Enrique J. Gramcko
Walter L. Gray
John E. H. Guthrie
William N. Hamilton
Jacob G. Hanna
Francis J. Harris
Edward M. Holmes
Richmond V. Hooper
William H. Hoyt
Alexander P. Husband
Ralph H. Hutchinson
Harry M. Imlay
Lafayette L. Irvin
David H. A. Irwin
John H. Johnson
William B. Jones
William E. Jones
John W. Joslin, Jr.
William Jost
Myrle Kaley
Joseph F. Keeley
Calvert E. Kelly
Percy E. Kendall
Kenneth Y. Kerr
Francis M. Kiel
Milton A. Kirshbaum
Marcel R. Leplat
John E. W. Lockery
Carleton F. Lore
Rene M. A. Loyer
Fred A. McComb
Joseph McCrystal, Jr.
Ernest J. McDougall
Francis J. McKeon
Edward K. McPherson
Douglas G. Macfarlane
George Macphee
Robert H. Maris
Leonard F. Martin
Andrew L. Massonnet
Charles J. Meyer
Fred D. Miller
Carlos H. Molina
Robert D. Morris
Roy N. Morrow
James J. Moynihan
Wilford G. Munson
Roscoe J. Nash
Guy E. Nicholas
Benjamin H. Northrop
George W. Oestreich
Cornelius J. O'Leary
Thomas H. Olive
George E. Parker
Matthew C. Pearce
John J. Perry
Glen S. Phillips
Frederick W. Pratt
Albert Protzel
Julius Protzel
Lyman F. Randall
Orville F. Randall
George H. Reed
Alberico D. de Rezende
Roy D. Ribble
Guy E. Riechelmann
Clyde S. Rine
Eugene W. Roberts
Thomas J. Roche, Jr.
Felix A. Rosado
Mervin F. Sandman
Robert C. Shields
Edwin Shoemaker
Harold S. Slocum
Warren L. Smith
William J. Sparrow
Charles Steffens
Alfred A. Steiger
David S. Stern
Harold A. Stone
John H. Stritch
Albert Strudel
Tracy B. Sturdevant
Charles W. Swing
Rodolfo Tarasido
William Tuck
Fritz E. Turowski
Elmer M. Van Dine
Ove F. Vibe-Hastrup
Slater R. Walker
Chester H. Webber
Charles S. Weigester
George E. White
Louis E. White
Daniel W. Wilbur
William S. Wilkinson
Joseph Edward Wilson
Howard C. Winter
Leo J. J. Wipprecht
Hamish C. Wood
Sakuro Yamagata
Robert J. Yeo
Arthur L. Yetman
Frank J. Younger

DRAKE UNIVERSITY, COLLEGE OF DENTISTRY.

THE annual commencement exercises of Drake University, College of Dentistry, were held in Des Moines, Iowa, on Wednesday, June 12, 1912.

The commencement address was delivered by Dr. Theodore P. Shonts.

The degree of Doctor of Dental Surgery was conferred by the president of the university on the following graduates:

Alphonze P. Atkins	Iowa
John A. Bliss	Iowa
Harry R. Cochran	Iowa
Lawrence V. Feike	Oklahoma
Grant E. Markle	Iowa
Leon F. Molumby	Iowa
Clyde L. Niblo	Iowa
Harry A. Spooner	Iowa
Forest E. Warren	Iowa
Hugh C. White	Iowa

STATE UNIVERSITY OF IOWA, COLLEGE OF DENTISTRY.

THE thirtieth annual commencement exercises of the College of Dentistry, State University of Iowa, were held in Iowa City, Iowa, on June 12, 1912.

An address was delivered by John H. Finley, LL.D.

The degree of Doctor of Dental Surgery was conferred on the following graduates:

Walter I. Anderson	Iowa
Yervant H. Babasinian	Turkey
Robert F. Beck	Iowa
Harry Brooks	Iowa
Don D. Davis	Iowa
Arthur S. Dice	Iowa
Horatio LeR. Duffin	Iowa
Julius C. Feuling	Iowa
Wm. B. Gerlits	Iowa
Joseph D. Halleck	New York
Rollin Harrison	Wisconsin
Harry Ingram	Iowa
Albert A. Joslyn	South Dakota
Harry L. Kalen	Iowa
Ilo B. Lynk	Iowa
Floyd McClellan	Iowa
Frank H. McLeod	Iowa
Wm. J. Masson	Iowa
Charles Motis	Nebraska
Winfred Moulton	Iowa
Philip C. Naumann	Iowa
Harry R. Norris	Iowa
Edward E. Pangborn	Iowa
Harry C. Park	South Dakota
Roy L. Probasco	Iowa
Wm. T. Sawyer	North Dakota
Orville E. Schlanbusch	Iowa
Mark C. Schutt	Iowa
Charles L. Shrader	Iowa
James H. Sowers	Iowa
Bert A. Weber	Iowa
Gale Wheeler	Iowa

MEDICO-CHIRURGICAL COLLEGE, DEPARTMENT OF DENTISTRY.

THE annual commencement exercises of the Medico-Chirurgical College, Department of Dentistry, were held in the Academy of Music, Philadelphia, Pa., on June 7, 1912.

The degree of Doctor of Dental Surgery was conferred by Hon. Henry F. Walton, president of the board of trustees, on the following graduates:

H. M. Ackerman
Isaac Barg
E. Barriero
C. A. Beam
James Brady
Herbert Clemmens
Pablio E. Castillo
Johan E. Coronel
Edgar A. Creighton
Robert T. Denton
F. W. Doyle
W. J. Donnelly
Samuel Dotlow
J. Fernandez
George R. Fleming
Jacob Freidman
Wm. J. Galupo
Paul S. Goble
H. R. Gibbs
M. C. Goldberger
Henry A. Gomez
A. M. Gordon
L. E. Hill
W. H. Hoffman
Hugh F. Hutchinson
Lewis K. Knight
Frank J. Kutcher
Austin McD. Lowrie
W. R. McGrath
Walter J. MacNeal
Henry H. Maginniss
Francis A. Mahan
Charles Martinez
Ralph W. Mellinger
Victor Mirabal
Dennis J. Murphy
Chas. D. O'Brien
Albert I. Parmer
Louis A. de la Para
Jose J. de Pena
W. J. Perkins
J. Albert Reilly
C. A. Roney
Daniel S. Russell
Sylvan Z. Segall
J. Howard Sharp
Andrew L. Stank
Erich Starke
Roy Stephens
Samuel Tomkins
Pedro N. Valdes
S. Weiman
Robert Weiss
Walter C. Wetzel
Robert W. Yates

UNIVERSITY OF PITTSBURGH, SCHOOL OF DENTISTRY.

The annual commencement exercises of the School of Dentistry, University of Pittsburgh, were held on June 19, 1912, in Carnegie Music Hall, Pittsburgh, Pa.

An address was delivered by Talcott Williams, LL.D.

The degree of Doctor of Dental Surgery was conferred on the following graduates:

Robert B. Black
Carl C. Boarts
Roderick R. Bryen
Paul N. Carlisle
Samuel E. Calhoun
Joseph A. Christy
Wilmot M. Crumrine
Avery C. Dryden
Walter C. Feick
Ross R. Feightner
William A. Frederick
Harold W. Gamble
James D. Gernon
Walter W. Hinchman
Sherman O. Huffman
George E. Hunker
Charles McK. Jameson
John V. Lindsey
Michael R. Mandelstein
Lewis S. Markell
Sadie N. Markowitz
Clarence M. Morgan
Howard A. McKenzie
William C. Pidgeon
Charles B. Pipes
Bert W. Pollum
John H. Prugh, Jr.
Charles B. Quailey
James A. Reese
Edward C. Shryock
Carl G. Sorgen
Thomas J. Stockdale
Alton J. Tibbott
Raymond C. Tinsley
Robert B. Tinsley
Francis D. Tyler
Elmer Weger

WASHINGTON UNIVERSITY DENTAL SCHOOL.

The fifty-first annual commencement exercises of Washington University Dental School were held on June 13, 1912, in St. Louis, Mo.

An address was delivered by Rev. Thomas L. Eliot, A.M., S.T.D.

The degree of Doctor of Dental Surgery was conferred by the chancellor, David F. Houston, LL.D., on the following graduates:

George F. Bellas
Fred H. Bierbaum
Fred J. Brockman
Alvin E. Davis
Frank H. Foerster
Lee V. Halbert
Godfrey W. Henske
William N. Holaday
Fuad J. Kahil
Hovanes H. Karian
Earl C. Kimbro
Walter A. Kreutzer
Ernest W. Lacy
Gaillard N. McDavid
Nathan L. McKee
Norman H. Niedringhaus
Otho E. Schaefer
William H. Siefert
Granville Sherman
William B. Spotts
William S. Thompson
Frank J. Wild, Jr.

PHILADELPHIA DENTAL COLLEGE (TEMPLE UNIVERSITY).

The annual commencement exercises of the Philadelphia Dental College (Temple University) were held on June 6, 1912, in the American Academy of Music, Philadelphia, Pa.

The commencement address was delivered by Rev. S. Parkes Cadman, D.D.

The degree of Doctor of Dental Surgery was conferred by the president, Dr. Russell H. Conwell, on the following graduates:

Charles E. B. Addie	Australia
J. Max Barber	Pennsylvania
Harold C. Barrett	Pennsylvania
Auguste R. Bastien	Hayti
Harper W. Blyler	Pennsylvania
Albert C. Box	Maine
Robert M. Carrick	New Jersey
James C. Carroll	Connecticut
Virgil R. Cloud	Pennsylvania
Dennis A. Connolly	Massachusetts
Arthur F. Des Rosiers	Connecticut
George H. Diefenderfer	Pennsylvania
Raymond W. Dimm	Pennsylvania
Raoul Duquella	Hayti
Charles C. Eppleman	New Jersey
Otto LeR. Fitzsimons	Canada
Guy M. Gray	Maine
Otto V. Kemp	Denmark
Eugenia B. Kreschmer	Pennsylvania
Jules X. LeBlanc	Louisiana
José Leon M.	Cuba
Samuel Mahood	New Jersey
Terrence A. McMahon	New York
Louis Metzger	Switzerland
Sara I. Murrin	Pennsylvania
Freeman H. Newlin	New Jersey
James S. Paterson	British West Indies
Raymond S. Penwarden	New Jersey
Martin A. Redington	Pennsylvania
Charles F. Rossell	Pennsylvania
Perley L. Russell	Maine
George Schaufelberger	Switzerland
Paul E. Schwartz	Wisconsin
William C. Spain	Connecticut
Fannie G. Tsipper	New York
Walter E. Vines	New Jersey
Adolf E. Wangemann	Texas
D. M. Wass	Maine
Harold G. Wilcox	New York
Paul C. Zbinden	Switzerland

SOCIETY NOTES AND ANNOUNCEMENTS.

DENTAL SOCIETY MEETINGS:

August and September.

AUGUST.

West Virginia State Dental Society. Webster Springs. Three days: August 14th to 16th.

SEPTEMBER.

Delta Sigma Delta Fraternity. Washington, D. C. September 9th.

International Congress on Hygiene and Demography. Washington, D. C. Six days: September 23d to 28th.

National Association of Dental Examiners. Washington, D. C. September 6th.

National Association of Dental Faculties. Washington, D. C. Two days: September 6th and 7th.

National Dental Association. Washington, D. C. Four days: September 10th to 13th.

National Dental Association, Southern Branch. [Jointly with N. D. A., at Washington.]

[At Washington.]

NATIONAL ASSOCIATION OF DENTAL EXAMINERS.

The thirtieth annual session of the National Association of Dental Examiners will be held at the New Willard Hotel, Washington, D. C., beginning Friday, September 6, 1912, at ten o'clock A.M., and continuing until adjournment.

Delegates expecting to attend are advised to make reservation early on account of the meeting of the National Association of Dental Faculties and the National Dental Association.

Henry L. Turner, *President*,
St. Louis, Mo.
T. A. Broadbent, *Sec'y*,
15 E. Washington st., Chicago.

[At Washington.]

NATIONAL DENTAL ASSOCIATION—SOUTHERN BRANCH.

Fifteenth Annual Meeting.

The fifteenth annual meeting of the Southern Branch of the National Dental Association will be held jointly with the National Dental Association at Washington, D. C., September 10 to 13, 1912, inclusive. Only a short business session will be held for the election of officers and transaction of such other business as may be brought before the meeting.

Thos. Moore, Jr., *Corresponding Sec'y.*

[At Washington.]

NATIONAL ASSOCIATION OF DENTAL FACULTIES.

The National Association of Dental Faculties will meet at the New Willard Hotel, Washington, D. C., on Friday and Saturday, September 6 and 7, 1912. The Executive Committee will meet at 9 o'clock Friday morning, the general meeting opening at 10 on the same morning.

George E. Hunt, *Sec'y.*

[At Washington.]

DELTA SIGMA DELTA FRATERNITY.

The twenty-eighth annual meeting of the Supreme Chapter of Delta Sigma Delta Fraternity will be held at the New Willard Hotel, Washington, D. C., Monday, September 9, 1912, at 10 A.M.

Business of importance and initiation have been arranged for the day, to be followed by the annual banquet in the evening.

R. Hamill D. Swing, *Supreme Scribe.*

N. D. A. Meeting at Washington, D. C.

September 10 to 13, 1912.

The 1912 session of the National Dental Association will be held in Washington, D. C., September 10th to 13th, and all indications are favorable for this being the most important and successful meeting that the association has ever held.

The Local Committee of Arrangements has selected the New Willard as "Headquarters Hotel" and for the meetings of the general sessions and the sections, as well as the "all-day clinic" on the last day. The commodious ballroom on the eleventh floor of this hotel provides ideal arrangements for a successful meeting—that is, all under one roof.

THE REORGANIZATION PROPOSITION

has been receiving most liberal support from the state societies which have met since the Cleveland meeting, at which a constitution, along the lines of the American Medical Association, was tentatively adopted. This question will come up at this meeting for final action, and everyone interested in the perfecting of a representative National Dental Association should be present. You are requested to remember this meeting when making your vacation arrangements, as an excellent opportunity is thus presented to attend the National Dental Association meeting and to visit our National Capital.

The following are on the literary program for addresses, lectures, and essays: Arthur R. Melendy (President's Address); Newell S. Jenkins, Dresden, Germany; Harvey W. Wiley, M.D., Leon S. Medalia, M.D., F. E. Stewart, M.D., C. V. Conzett, B. Holly Smith, M. L. Rhein, T. B. Hartzell, George E. Hunt, C. A. Hawley, George B. Harris, W. O. Hulick, M. C. Smith, C. M. McCauley, W. A. Lovett, Joseph Head, H. H. Johnson, J. F. Biddle, and J. J. Moffitt. I have not been furnished with all the subjects of the above at this date (July 10th), and for that reason all the subjects have been omitted; however, all of these selected are men of recognized ability, and they will cover the important subjects before our profession today.

The details of the program are not complete, but the officers and committees have spared no effort in preparing the same. Further information will appear in the issue of the DENTAL COSMOS for September.

ARTHUR R. MELENDY, *President*,
Deaderick Bldg., Knoxville, Tenn.
HOMER C. BROWN, *Rec. Sec'y*,
185 E. State st., Columbus, Ohio.

FROM THE LOCAL COMMITTEE OF ARRANGEMENTS.

Washington as a Convention City.

THE essential requisites necessary for a successful national convention are: Central location for place of meeting; hotel and publicity facilities; convenient and suitable accommodations for presenting program; and not the least important, interesting and pleasant surroundings.

The National Dental Association meets alternately in the West, East, and South. Washington is in the Southern division, and no southern city is so accessible to the different sections of our country as is the National Capital.

Washington supplies all of these requisites and offers much more. A city that can easily handle the enormous crowds of visitors that throng the streets every four years at the inauguration of the President of the United States is patently equipped to care for any influx of visitors at other times. Washington hotel men have become accustomed to quick expansion and contraction of business. The coming and departure of Congress, with the thousands dependent upon its sessions, and the large number of conventions which have been coming to the city in recent years have served to make irregularity in numbers at depots and hotels the regular thing. Two conventions of considerable proportions were recently held in a single hotel, with no confusion in session-halls, banquets, or accommodations.

As to publicity facilities, there is no greater news-distributing center in the United States. Correspondents representing not only all of the daily newspapers of the country and many of the foreign journals have their offices in Washington, but even the technical and trade publications have their contributors and regular correspondents at the Capital.

Every patriotic American should be familiar with the National Capital, which now well merits the often-heard titles of "The City Beautiful" and "The Paris of America." Besides the many public buildings, museums, libraries and parks, etc., the Government Departments hold thousands of features of interest to visitors.

Places of Interest.

In pleasant surroundings for the visiting delegate and his wife or daughter, who often accompany him, Washington far excels any other city of the country. It is the custom for delegates to conventions here to use much of their time seeing the hundreds of interesting and beautiful places in and about the city by means of the "Touring Washington" automobiles, upon which guides point out, as the trip proceeds, the places of especial interest. Then there are many side trips. Mt. Vernon, the home of Washington, is reached both by steamer and trolley; Alexandria, Cabin John Bridge, Arlington, and Old Annapolis, the site of the United States Naval Academy, are easily accessible by trolley cars. To the last place and to Baltimore there is a new line of heavy interurban electric cars, which travel so fast that the trip to either place is made in shorter time than by the steam roads. Washington itself, the City Beautiful, is a constant delight to the visitor, and the government departments hold thousands of features of interest to every American, and many features of special interest to delegates to conventions.

It will well repay the members of the National Dental Association to linger a few days after the meeting, or to come a few days before and spend the time visiting Washington.

Information regarding railroad rates may be secured from your local agent, as conditions vary in different sections of the country. Any agent will gladly furnish any information requested.

JOHN H. LONDON, *Chairman*
Local Committee of Arrangements,
926 Farragut Square, Washington, D. C.

Hotels.

The headquarters of the National Dental Association and also of the National Association of Dental Faculties is the New Willard Hotel. Meetings and clinics will be held in the large ballroom on the eleventh floor. Write the hotel and make your reservations early.

Below is given a list of the principal hotels, with their rates:

S = Single, without bath. *Sb* = Single, with bath.
D = Double, " " *Db* = Double, " "

New Willard (Pennsylvania ave., 14th and F sts., N. W.): *S* $2.50 per day and up, *Sb* $3.50 per day and up; *D* $4.00 per day and up, *Db* $5.00 per day and up.

The Raleigh (Pennsylvania ave. and 12th st., N. W.): *S* $2.00 per day and up, *Sb* $3.00 per day and up; *D* $3.00 per day and up, *Db* $4.00 per day and up.

Shoreham (15th and H sts., N. W.): *S* $2.00 per day and up, *Sb* $3.00 per day and up; *D* $3.00 per day and up, *Db* $5.00 per day and up.

Ebbitt House (14th and F sts., N. W.): *S* $1.50 per day and up, *Sb* $2.50 per day and up; *D* $2.00 per day and up, *Db* $3.50 per day and up.

Hotel Gordon (16th and I sts., N. W.; American and European): American plan, $3.00 to $4.50 per day; European plan, $1.50 to $2.50 per day.

Normandie Hotel (15th and I sts., N. W.; European): *S* $1.50 and $2.00, *Sb* $2.50 to $3.50; *D* $3.00 to $4.00, *Db* $4.00 to $6.00.

New Fredonia Hotel (H st. between 13th and 14th sts., N. W.; American and European): American plan, $3.00 per day and up; European plan, $1.50 per day and up.

Cochran Hotel (14th and H sts., N. W.; American and European): American plan, $3.00 per day and up; European plan, $1.50 per day and up.

Hamilton Hotel (14th and K sts., N. W.; American): $2.50 per day and up.

Dewey Hotel (American and European): American plan, $2.50 per day and up; European plan, $1.50 per day and up.

National Hotel (6th st. and Pennsylvania ave., N. W.; American and European): American plan, $2.50 per day and up; European plan, $1.50 per day and up.

St. James Hotel (European plan): $1.00 per day and up.

Grand Hotel (15th st. and Pennsylvania ave., N. W.; American and European): American plan, $2.00 per day and up; European plan, $1.00 per day and up.

NOTICE FROM THE CLINIC COMMITTEE

All-day Clinic, Friday, September 13th.

THE Clinic Committee desires to extend to all members in good standing of all dental societies a cordial invitation to attend and to clinic at the "all-day" clinic of the association, to be held at the New Willard Hotel, Washington, D. C., Friday, September 13th. The enormous ballroom, top floor of this hotel, has been secured, and the management promises us every convenience.

We call your attention to the classification of the clinical material. Every effort will be made to arrange the different events according to title and in sequence, so that the various steps in the operation may be seen at a glance, without the usual regard to chair or table. This will avoid confusion and save time, allowing the members to select and study favorite subjects without hunting all over the room.

From the material now in hand the committee can promise a large and varied clinic. In order that we may assemble all clinicians' names and titles for the preliminary program, kindly reply at once to the chairman.

COMMITTEE.

C. J. GRIEVES, *Chairman*, Park ave. and Madison st., Baltimore, Md.

A. O. ROSS, *Vice-chairman*, 807 N. High st., Columbus, Ohio.

S. W. BOWLES, *Secretary*, 1616 I st., Washington, D. C.

W. R. CLACK, Mason City, Iowa.
A. P. BURKHART, Auburn, N. Y.
J. T. MCCLENAHAN, Washington, D. C.
W. D. TRACY, New York, N. Y.
GEORGE E. SAVAGE, Worcester, Mass.
JOHN H. MCCLURE, Wheeling, W. Va.
J. E. CHACE, Ocala, Fla.
E. L. PETTIBONE, Cleveland, Ohio.
H. J. ALLEN, Washington, D. C.
W. R. WRIGHT, Jackson, Miss.
C. A. LUNDY, Los Angeles, Cal.
S. H. MCAFEE, New Orleans, La.
C. M. BARNWELL, Atlanta, Ga.
RICHARD L. SIMPSON, Richmond, Va.
W. H. SCHERER, Houston, Texas.

NOTICE FROM THE EXHIBIT COMMITTEE.

Manufacturers' Exhibit.

THE manufacturers' exhibit during the convention of the National Dental Association in Washington, September 10 to 13, 1912, inclusive, will be held in the New Ebbitt Hotel, which is just across the street from the headquarters and the clinics. Specifications, plans, rates, and full information can be had by addressing

CLYDE M. GEARHART, *Ch'man Exhibit Com.*,
1616 I st., N. W., Washington, D. C.

INTERNATIONAL CONGRESS ON HYGIENE AND DEMOGRAPHY,

Washington, D. C., September 23d to 28th.

To THE MEMBERS OF THE DENTAL PROFESSION OF THE UNITED STATES OF AMERICA:

The fifteenth International Congress on Hygiene and Demography is to be held in Washington, D. C., September 23–28, 1912, under the auspices of the United States government.

This organization is the highest authority in matters of hygiene in existence today, and this is the most important meeting of the kind held in this country in its history; and the United States government is acting as host to the fifteen nations that have so far signified their intention of participating in the coming congress. Through the courtesy of the United States government the dental profession of this country has received an invitation to contribute to its success. This is the first time that the dental profession of this country has received such recognition by the home government. Place has been made for representation of the dental profession both upon the literary program and among the exhibitors.

The opportunity for which we have been seeking—that is, the opportunity to show the important relation the human mouth bears to the health, strength, and welfare of mankind—is now before us. The influence of this congress is world-wide in its scope and it will be visited by many thousands of people who are interested in hygiene and the general welfare of mankind. If American Dentistry is to maintain its reputation throughout the world, it behooves the members of the profession of this country to unite in a general effort to have the largest, finest, and most instructive dental exhibit in the history of dentistry assembled on this occasion, and at the request of the Oral Hygiene Committee N. D. A., Dr. J. W. Schereschewsky, U.S.P.H. and M.H.S., director of the exhibition, has set aside 1000 sq. ft. of floor and 500 sq. ft. of wall space in the building which is being erected for the exhibits, to be devoted to the use of the dental profession for exhibit purposes. At the meeting of the committee held in Cleveland, March 23, 1912, a resolution was passed inviting the oral hygiene committees of all state and local organizations to co-operate with it in making a success of this exhibit. Space will be assigned in such a manner that each state, city, and town will receive full credit for contributions in this direction.

The committee earnestly requests that every member of the profession who is interested in mouth hygiene and in the welfare of the dental profession become actively interested in a campaign to make a success of this exhibit. The oral hygiene committees of the state dental societies should endeavor to place themselves in touch with local organizations in their states in an endeavor to secure aid in the way of material suitable for exhibits and money to defray the expenses of such an exhibit as this should be. The committee would ask that each state and local organization make appropriations to meet the expense of collecting, mounting, and displaying such material as would make a creditable exhibit.

The committee requests that the oral hygiene committees that can or will take part in this exhibit communicate at the earliest possible moment with Dr. W. G. Ebersole, chairman of the Oral Hygiene Committee N. D. A., 800 Schofield Bldg., Cleveland, Ohio; for local information, Dr. W. Smith Frankland, The Burlington, Washington, D. C., assistant secretary-treasurer of the National Mouth Hygiene Association for the District of Columbia.

The Oral Hygiene Committee N. D. A. instructed its secretary, Dr. Waldo E. Boardman of Boston, Mass., to communicate with Dr. Wm. H. Potter of Boston, Mass., with a view of obtaining some ideas derived from the dental exhibit shown at the International Hygiene Exhibition in Dresden, May to October 1911. Dr. Potter's response is given herewith with a view of giving some idea of how to build or prepare an exhibit of this kind:

BOSTON, April 13, 1912.

Dear Dr. Boardman,—In regard to the dental exhibit at the International Hygiene Exhibition in Dresden, May to October 1911, I am obliged to rely on my memory, inasmuch as I was unable to find a catalog of this portion of the department. There were in the exhibit as follows:

(1) Large numbers of anatomical specimens. Skulls; parts of skulls with teeth in

place. In this respect it was similar to the exhibition in connection with the Fifth International Dental Congress, Berlin, 1909.

(2) Orthodontia cases represented by models. Regulating apparatus.

(3) Teeth representing the progress of decay from the initial softening to the large destructive cavity.

(4) Charts showing the percentage of dental decay among people of various occupations and living under various conditions.

(5) Charts showing the influence of food and water (hard or soft) upon the percentage of dental decay.

(6) Charts giving rules for the prevention of decay.

(7) School dental clinics. A description of the most important ones of Europe, with literature giving statistics and methods of work.

(8) The analysis of saliva. Charts showing the method employed.

These are a few of the features. There were many more which I wish I could remember.

Very truly yours,
WM. H. POTTER.

Let every member of the profession who is interested write offering to do his part. Do not wait for us to write to you, for we have much to do if we undertake to make a success of this work.

At the same meeting the Oral Hygiene Committee passed a resolution inviting the dental colleges of this country to contribute to the success of the dental exhibit; and the secretaries or deans of the various colleges are requested to communicate either with Dr. W. G. Ebersole or Dr. W. Smith Frankland indicating what aid they will give in connection with the coming exhibit. It will be so arranged that each college will be assigned space for its own exhibit. Come to our aid and give us your hearty support in this work.

Appealing to every member of the profession to become actively interested in this exhibit in the interest of the dental profession as a whole, we are

Respectfully yours,
W. G. EBERSOLE,
B. HOLLY SMITH,
WALDO E. BOARDMAN,
J. V. CONZETT,
S. W. FOSTER,
Oral Hygiene Committee N. D. A.

PRIZE COMPETITION

OF THE

Zentralverband der Oesterreichischen Stomatologen.

IN view of the tenth anniversary of its organization, the Zentralverband offers a prize of K.500.00 ($100.00) for the best heretofore unpublished essay on any subject of stomatology. Only those papers which are submitted by medical men and dentists to the president of the association (Vienna I, Graben 31) between March 1, 1912, and February 28, 1913, will be admitted to the competition.

An essay cannot be withdrawn after once having been handed in.

The judges reserve the right to divide the prize into two equal parts, should two essays of equal value be submitted. If none of the essays is adjudged worthy of the prize, the competition may be kept open for a further period not exceeding two years.

The author agrees to place his work at the disposal of the *Oesterreichische Zeitschrift fuer Stomatologie* for original publication.

The essays must be handed in ready for publication, and will if possible appear within the period open for the competition. Every essay published will be paid for at the usual rate of K.80.00 ($16.00) per galley. The cost of printing, including the illustrations, will be borne by the journal.

For the Zentralverband der Oesterreichischen Stomatologen:
Dr. W. HERZ-FRAENKL, *Pres.*,
Dr. RUDOLF BUM, *Sec'y.*

WEST VIRGINIA STATE DENTAL SOCIETY.

THE sixth annual meeting of the West Virginia State Dental Society will be held in the assembly-room of Webster Springs Hotel, Webster Springs, W. Va., August 14, 15, and 16, 1912; opening session at 2 o'clock on Wednesday the 14th.

The dentists of West Virginia, Virginia, Ohio, and Maryland are especially invited, and a cordial invitation is extended to all ethical members of the profession.

FRANK L. WRIGHT, *Sec'y,*
Wheeling, W. Va.

OHIO STATE DENTAL SOCIETY.

MEETS AT CINCINNATI THIS YEAR.

THE Ohio State Dental Society, which usually meets in Columbus, will hold its annual meeting December 3, 4, and 5, 1912, at Hotel Sinton, Cincinnati. A big meeting is assured.

F. R. CHAPMAN, *Sec'y*,
305 Schultz Bldg., Columbus, Ohio.

MONTANA STATE DENTAL SOCIETY.

AT the meeting of the Montana State Dental Society, held in Missoula, Mont., June 14 and 15, 1912, the following officers were elected: W. H. Barth, Great Falls, president; T. T. Rider, Missoula, secretary.

Dr. George W. Cook, Chicago, gave clinics and lectures at the meeting. The next meeting is to be held at Butte, Mont., next June.

WM. H. BARTH, *President.*

NEW YORK INSTITUTE OF DENTAL TECHNIQUE.

AT the annual meeting of the New York Institute of Dental Technique, held in May, the following officers for the ensuing year were elected: Leland Barrett, president; William C. Fisher, vice-president; Bissell B. Palmer, Jr., secretary; Oscar J. Chase, treasurer.

This society allied last year with the First District Dental Society of New York, and suspended all scientific meetings for two years.

W. C. FISHER, *Vice-president,*
New York, N. Y.

EASTERN DENTAL SOCIETY OF THE CITY OF NEW YORK.

ON May 2, 1912, the last meeting of the session was held at the Hotel Astor, Times Square, New York city, when Herman Schwamm, D.D.S., LL.B., delivered a most instructive lecture on "The Legal Relation of the Dentist to His Patient."

The following are the officers elected for 1912–1913: Mark A. Schwartz, president; H. Schwamm, vice-president; Victor Ettinger, treasurer; A. LeWitter, secretary.

A. LEWITTER, *Sec'y.*

ARMY DENTAL SURGEONS.

MEMORANDA OF CHANGES.

For the week ending June 15, 1912:

First Lieut. Frank P. Stone, June 6th, reports return to Fort Barrancas, Fla., for temporary duty at Fort Screven, Ga.

Charles E. Sherwood, C.D.S., June 4th, returned to Presidio of Monterey, Cal., for temporary duty at Presidio of San Francisco, Cal.

First Lieut. George L. Mason, June 7th, granted two months' leave of absence about July 1st.

For the week ending June 22d:

First Lieut. R. E. Ingalls, June 17th, granted two months' leave of absence about July 1st.

First Lieut. John A. McAlister, Jr., June 16th, returned to Jefferson Barracks, Mo., from leave of absence.

First Lieut. John H. Snapp, C.D.S., June 10th, reported for duty at Camp E. S. Otis, Canal Zone, Panama.

First Lieut. Frank P. Stone, June 18th, left Fort Barrancas, Fla., on thirty days' leave of absence.

First Lieut. S. D. Boak, June 20th, left West Point, N. Y., on thirty days' leave of absence.

For the week ending June 30th:

First Lieut. John H. Hess, June 15th, ordered to Forts Apache and Huachuca, Ariz., for temporary duty.

For the week ending July 5th:

James F. Feely, C.D.S., June 30th, left Fort Totten, N. Y., on ten days' leave of absence.

First Lieut. George L. Mason, July 1st, left Fort Snelling, Minn., on two months' leave of absence.

For the week ending July 13th:

Arnett P. Matthews, C.D.S., June 13th, reports for duty at Schofield Barracks, H. T.

First Lieut. R. E. Ingalls, July 1st, left Vancouver Barracks, Wash., on two months' leave of absence.

Charles B. Seely, Jr., C.D.S., July 3d, ordered to Fort Sam Houston, Texas, for duty.

First Lieut. John H. Hess, July 3d, left Fort Douglas, Utah, *en route* to Fort Apache, Ariz., on detached duty.

Itineraries.

By para. 4, S. O. 135, Headquarters Eastern Division, June 13, 1912, each of the following-named dental surgeons, with his enlisted assistant, will proceed at the proper time to the posts named, and report to the commanding officers for temporary duty, for the purpose of rendering dental service during the periods indicated. In no case will a dental surgeon remain at a post later than the date set in the itinerary, except by authority of the division commander.

All applications for leave of absence by dental surgeons while on this tour of duty will be forwarded to these headquarters for action.

First Lieut. Frank P. Stone: Ft. Banks, Mass. [incl. Fts. Andrews and Strong, Mass.], July 16–Aug. 15. Ft. Constitution, N. H., Aug. 16–Aug. 23. Ft. Williams, N. Y. [incl. Ft. McKinley, Me.], Aug. 24–Oct. 7. Ft. Ethan Allen, Vt., Oct. 8–Oct. 29. Plattsburg Barracks, N. Y., Oct. 30–Nov. 22. Madison Barracks, N. Y., Nov. 23–Dec. 7. Ft. Ontario, N. Y., Dec. 9–Dec. 16. Ft. Porter, N. Y., Dec. 17–Dec. 23. Ft. Niagara, N. Y., Dec. 24–Dec. 31.

Acting Dental Surg. Mortimer Sanderson: Ft. Du Pont, Del. [incl. Ft. Mott, N. J.], July 1–Aug. 2. Ft. Howard, Md. [incl. Ft. McHenry, Md.], Aug. 3–Aug. 27. Washington Barracks, D. C., Aug. 28–Sept. 21. Ft. Myer, Va., Sept. 23–Oct. 16. Ft. Washington, Md. [incl. Ft. Hunt, Va.], Oct. 17–Nov. 9. Ft. Monroe, Va., Nov. 11–Dec. 31.

Acting Dental Surg. Arthur T. Knoderer: Ft. Crockett, Tex., July 1–July 9. Jackson Barracks, La. [incl. Ft. St. Philip, La.], July 11–July 18. Ft. Morgan, Ala., July 19–Aug. 3. Ft. Barrancas, Fla., Aug. 5–Aug. 20. Ft. Dade, Fla., Aug. 22–Aug. 29. Key West Barracks, Fla., Aug. 31–Sept. 9. Ft. Screven, Ga., Sept. 11–Sept. 26. Ft. Moultrie, S. C., Sept. 27–Oct. 12. Ft. Caswell, N. C., Oct. 14–Oct. 29. Ft. McPherson, Ga., Oct. 31–Nov. 30. Ft. Oglethorpe, Ga., Dec. 2–Dec. 31.

Acting Dental Surg. James F. Feely: Ft. Warren, Mass., July 11–July 18. Ft. Rodman, Mass., July 19–July 26. Ft. Adams, R. I. [incl. Ft. Greble, R. I.], July 27–Aug. 20. Ft. H. G. Wright, N. Y. [incl. Ft. Terry, N. Y.], Aug. 21–Oct. 1. Ft. Jay, N. Y., Oct. 2–Oct. 17. Ft. Wood, N. Y., Oct. 18–Oct. 25. Ft. Wadsworth, N. Y., Oct. 26–Nov. 2. Ft. Hancock, N. J., Nov. 4–Nov. 27. Ft. Totten, N. Y., Nov. 29–Dec. 13. Ft. Hamilton, N. Y., Dec. 14–Dec. 31.

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UNITED STATES PATENTS

PERTAINING OR APPLICABLE TO DENTISTRY

ISSUED DURING JUNE 1912.

June 4.

No. 1,028,539, to Robert E. Campbell. Dental crown and backing.

No. 1,028,582, to Elmer I. McKesson. Anesthetic-administering apparatus.

No. 1,028,583, to Elmer I. McKesson. Rebreathing bag for anesthetizing apparatus.

June 11.

No. 1,029,160, to Franz Wickner. Artificial tooth.

June 25.

No. 1,030,530, to Don H. Palmer. Speculum.

DR. C. F. W. BÖDECKER.

THE

DENTAL COSMOS.

VOL. LIV. SEPTEMBER 1912. No. 9.

ORIGINAL COMMUNICATIONS.

THE WAX PATTERN: A TECHNIQUE, TOGETHER WITH APPLIANCES, ETC., FOR ITS EXECUTION.

By C. S. VAN HORN, D.D.S., Bloomsburg, Pa.

(Read at the forty-ninth annual meeting of the Susquehanna Dental Association of Pennsylvania, at Wilkes-Barre, May 21, 1912; also at the second annual union meeting of the Southern, Mercer, and Atlantic Dental Societies at Atlantic City, N. J., June 21, 1912.)

UPON the manner in which pattern wax is manipulated and treated depends very largely the therapeutic value of the cast inlay. In former papers,* attention has been called to the physical properties of pattern wax and to the necessity for its careful handling; but no consideration has yet been given to the variety of cavity conditions that present or to methods of meeting them. As this is such an important part of the casting process, a consideration of some of these conditions and methods seems pertinent at this time.

To avert needless verbiage and useless repetition, let us, in this paper, divide *all* cavities into three classes, viz, simple, compound, and complicated, a simple cavity being represented by a more or less symmetrical hole in the buccal or labial surface of a tooth, a compound one by an approximo-occlusal cavity that extends to or just beneath the free margin of the gum tissue, and a "complicated" one by any cavity presenting unusual difficulties—as where a compound cavity extends far beneath the free margin of the gum. Of course, innumerable variations will present, but what we most desire at this time is to consider basic principles—to build a foundation which may be added to, modified, or altered, to meet any and all conditions which we may be called upon to treat.

The phrase, "Anyone who can fill a cavity with wax and fuse gold can make a cast inlay," has justly been relegated to the "dark ages" of the casting process, with the result that it is more generally recognized that each cavity requires in telligent consideration, and that the pattern must be made and invested accordingly, if the highest efficiency in service is to be rendered.

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* See the author's papers on "Casting," DENTAL COSMOS, August 1910, p. 873; "Concerning Casting Methods and Casting Devices," *Ibid.*, June 1911, p. 664; "Standardizing the Investing Process and Simplifying the Casting Process," *Ibid.*, October 1911, p. 1109; "Casting Failures and Remedies," *Ibid.*, August 1912, p. 820.

Let us here lay down three important rules applicable to all pattern-making:

(1) A *finished* pattern should not be replaced in the tooth cavity.

(2) In all simple and compound and in most complicated cavities the wax should, prior to its introduction into the cavity, be formed to simulate the shape of the finished pattern.

(3) In complicated cavities, where it is necessary to remove the wax from the cavity prior to finishing, in order to ascertain whether the pattern has reached all margins, it must not be replaced in the cavity without first coating the entire cavity surface of the pattern with melted "liquid" wax.

Non-plastic pattern wax, the only kind suitable for the purpose, is available in two forms: In sticks of about 5/16 inch in diameter by 4 inches long, and in cones of various shapes and sizes; each form has its place as an auxiliary, but it must be kept constantly in mind that few cavities present which do not require special forms. How these forms are made, the way in which the wax is manipulated and subsequently invested will be the main theme of this paper.

A SPECIAL TECHNIQUE.

Provided the fundamental principles governing all pattern-making be fully grasped, simple cavities require but little care. Assume that we have a cavity in the buccal surface of a molar: A piece of wax a trifle smaller than the orifice of the cavity and of sufficient length to give ample surplus is softened in the wax-softener and removed, the cavity surface is dipped into liquid wax and immediately carried to the moist cavity, carefully but firmly pressed home, and carved and polished. The wax forms for patterns for simple cavities are usually easily made by carving one of the wax cones which is of appropriate size and shape to simulate the shape of the finished pattern. Fig. 1 shows a number of wax forms suitably carved to meet a variety of buccal and labial cavities which present in everyday practice.

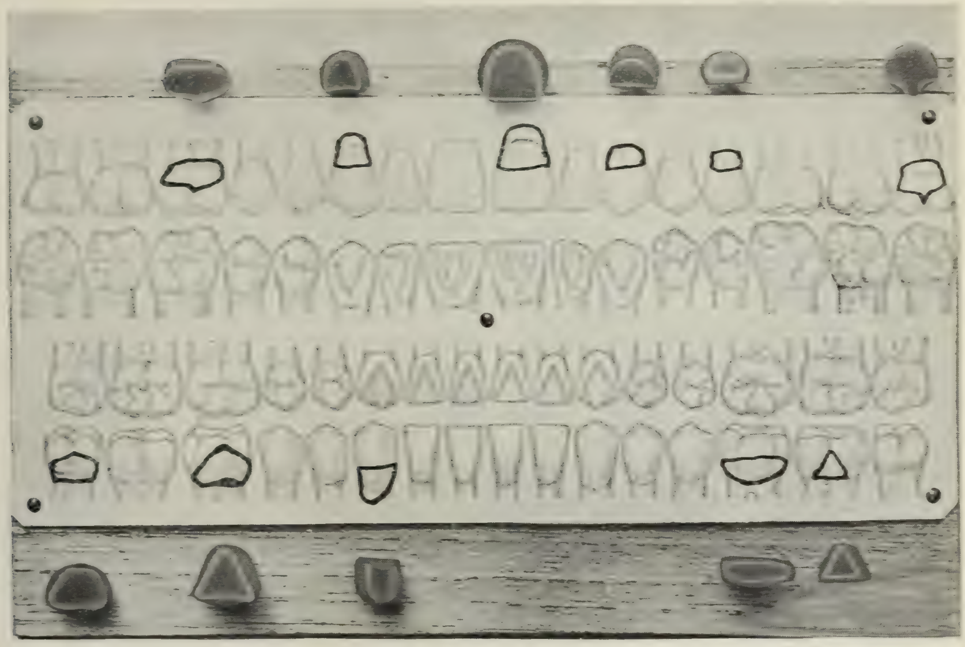
Compound cavities require more care, and the forms for them are not so readily made. Taking the cavity represented in Fig. 2 as a fair example of this type of cavity, the wax form may be made in any one of several ways: By carving the form from a stick of pattern wax as illustrated (see Fig. 2, No. 1 being the first step in carving the wax form, No. 2 the wax form completed, ready for the cavity, and No. 3 the finished wax pattern); or by selecting an appropriate cone and fusing the end in such a manner that it will assume an "L" shape, adding liquid wax where necessary; or by fusing the ends of two cones and sticking them together at a right angle. The illustrations show various ways of constructing wax forms, which can easily be modified to meet conditions as they present. After the wax form is completed, it is softened, pressed carefully but firmly into the moist cavity, and carved and polished.

GOLD FILLINGS *VS.* INLAY RESTORATIONS.

It is a theory with the writer that no restoration equals in efficiency a gold filling properly placed, contoured, and finished, provided this can be done without imposing undue strain upon the patient or inviting permanent injury to the enamel, gum tissue, or pericemental membrane. It therefore follows that in proportion as a tooth is broken by caries, or as the cavity or vulnerable margins are inaccessible, the cast inlay process of restoration is indicated. This implies that complicated cavities, every other factor being equal and special cases excepted, are the ideal field for cast inlays.

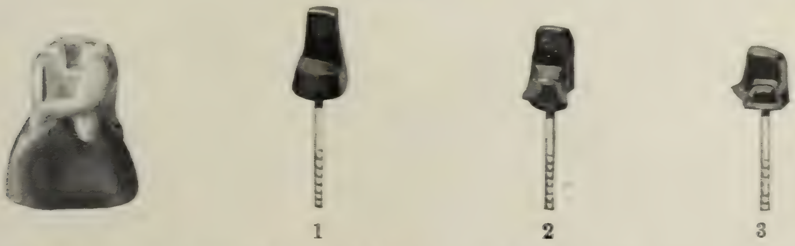
Conscientious intelligence never has nor ever will be duped into believing that an inlay presenting a broad line of unprotected disintegrable material is dependable as a therapeutic agent. Neither does the consensus of intelligence born of experience permit the assumption that cast gold inlays, made for complicated cases, ever reach their marginal destination unless the pattern be properly and perfectly adapted and scientifically invested. Since "complicated" cavities comprise no small part of our work, and as they seem to be the most dreaded of all, both from the viewpoint of perfect pattern-making and successful casting—by which we mean castings that do not show evidence of any shrinkage—the writer feels that he will not be imposing by presenting, somewhat in detail, certain procedures looking toward ultimate simplicity in pattern manipulation and perfection in casting results.

FIG. 1.



Showing a number of wax forms suitably carved to meet a variety of buccal and labial cavities, as outlined on the attached Allan chart.

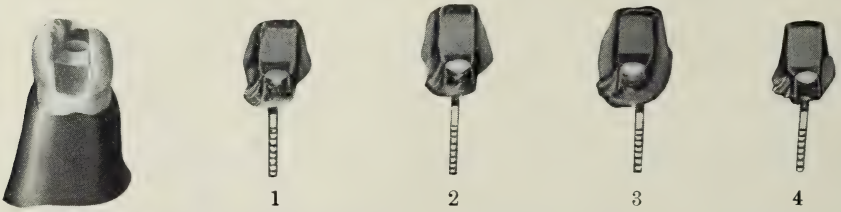
FIG. 2.



Approximo-occlusal cavity. Wax form made from a stick of pattern wax. 1. First step in carving the wax form. 2. Wax form completed, ready for the cavity. 3. The finished wax pattern.

The cavity in Fig. 3 differs from the one in Fig. 2 only in that it extends much beneath the free margin of the gum tissue; it is this cervical extension that places it in the complicated class, and makes pattern adaptation by ordinary methods difficult, the difficulty consisting in forcing the wax into contact with the cervical margin of the cavity. Ordinarily, the pattern for this cavity (Fig. 3) would be made in precisely the same manner as the pattern for the cavity in Fig. 2, previously described. But if there be uncertainty as to the wax reaching its marginal destination, then recourse is had to the liquid-wax process, a process which has done much, in the writer's practice, to place pattern-making upon a certain and a scientific basis.

Fig. 3.



Approximo-occlusal cavity, showing steps in the "liquid wax process." 1, Wax tray removed from cavity. Note that the wax has not reached the cervical margin of the cavity. 2, Wax tray coated with "liquid wax" ready for insertion into the moist cavity. 3, Shows how it would appear if it were removed from the cavity prior to finishing. Note sharpness and detail of cavity margins, especially at the cervix. 4, The wax tray with its wax coating converted into a finished wax pattern.

THE LIQUID-WAX PROCESS.

Assuming that doubts exist respecting the pattern reaching the cervical margin of the cavity (see Fig. 3), the procedure would be as follows: A wax form is made and pressed into the moist cavity, as previously described for the case in Fig. 2; any large overhanging surplus is cut away while the wax is *in situ,* and the resultant wax mass is removed from the cavity. It is now freed from saliva and any blood by washing in running water or by spraying, dried with cold air, and immersed in ether. We now have a more or less perfect impression of the cavity and immediate surrounding tooth tissue—Fig. 3, No. 1, which in effect is used as a tray to carry the liquid-wax coating to all parts of the cavity and to force it firmly against all margins. The technique is as follows:

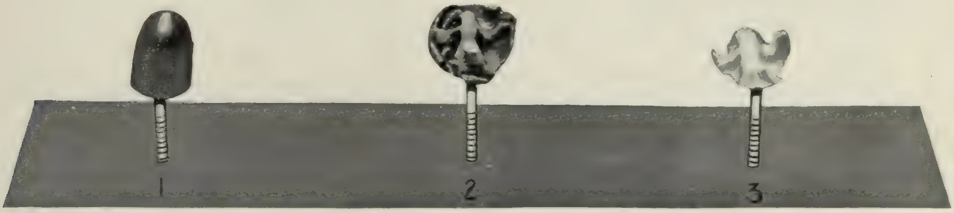
After the wax mass—which shall henceforth be designated as the wax tray—has been washed and dried, and any trimming which may be deemed essential has been done, it is attached to the wax-carrier, placed in the wax-softener, and the temperature is raised to the desired degree. The wax tray is now removed from the wax-softener, and the entire cavity surface coated with liquid wax, by painting it on with a No. 2 badger-hair (porcelain) brush, the painting being done as indicated by the perfectness of the markings left by the cavity in the wax tray. To illustrate: Assuming that our wax tray does not show a demarcation of the cervical margin of the cavity (Fig. 3, No. 1), but is apparently perfect in other details, we know that a greater bulk of wax is needed at that point than at any other; so the wax tray is coated accordingly. (See Fig. 3, No. 2.) Just as soon as the wax tray is properly coated, it is immediately carried to the moist cavity, and carefully but firmly pressed home, carved, and polished, the wax tray with its *wax coating* being thus converted into a finished wax pattern. (See Fig. 3, No. 4.)

Cavities similar to the one indicated in

Fig. 4, which is taken from a practical case, are, as a rule, more easily manipulated by a slight change in technique. Instead of making a wax form as in the previous cases, a piece of wax or a cone, much larger than is required for the pattern, is softened, pressed into the moist cavity, and adapted—*not finished*—as perfectly to the margins as possible; any large overhanging surplus is cut away, the resultant mass, which will be the wax tray (Fig. 4, No. 2) is removed from the cavity, washed, dried, reheated in the wax softener, the entire cavity surface coated with liquid wax, and from this on proceeded with as in the previous cases.

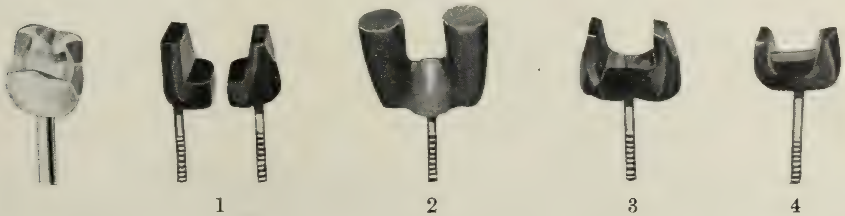
The cavity in Fig. 5, a double compound—mesio-occluso-distal cavity, has been causing some literary turmoil and much concern as to ultimate results both in pattern-making and in casting, but in reality it is not at all difficult to manage, if proper methods be employed. It will depend somewhat upon the operator and largely upon the case as to how this type of cavity is best manipulated. A favorite method with the writer is to make a wax form by either carving from a stick of pattern wax two forms in precisely the same manner as though dealing with a single instead of a double compound cavity (Fig. 5, No. 1), and then fusing these two forms together at the ends of the occlusal extensions; or by selecting three cones of appropriate sizes and shapes and arranging them in such a manner that the central cone will form the occlusal extension when the three cones are fused together (Fig. 5, No. 2, also Fig. 7, Nos. 1, 2, 3) using a single

FIG. 4.



Occlusal cavity in third molar, showing slight change in the "liquid wax process." 1, Wax cone selected for this case; after softening it is pressed into the cavity. 2, Wax tray—not coated with "liquid wax." 3, Gutta-percha stopping, which in this case shows the wax tray with its wax coating converted into a finished wax pattern.

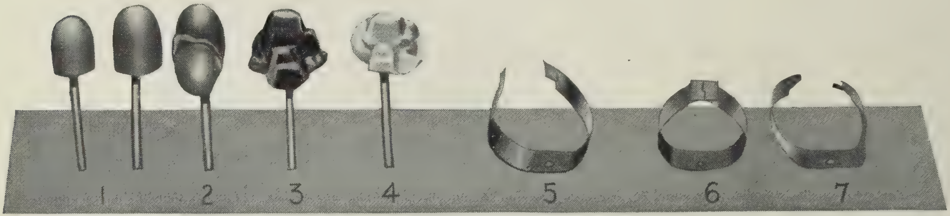
FIG. 5.



Mesio-occluso-distal cavity in lower first molar. 1, First step in making wax form by carving two forms from a stick of pattern wax. 2, First step in making wax form by fusing three appropriate cones together so that the central cone forms the occlusal extension. 3, One of the wax forms completed, ready for insertion into the moist cavity. 4, The finished wax pattern.

cone for bicuspids. The wax form is then softened, pressed into the moist cavity, carved, and polished. This method, however, applies only to those cases in which there is no question as to the wax reaching its destination. In those cases in which doubt exists, the wax-tray method should be employed.

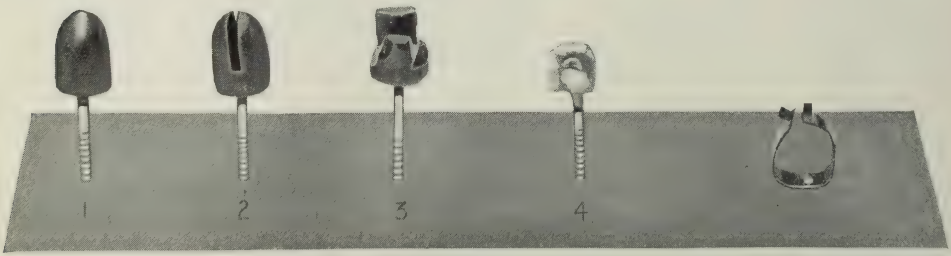
Fig. 6.



(Case from practice.) Upper first molar (devitalized); approximo-occlusal cavity, mesial aspect. 1, The two wax cones selected for this case. 2, First step in their preparation. 3, Completed wax form ready for insertion into the moist cavity. 4, Temporary stopping, which in this case represents the finished wax pattern. *Steps in making the matrix:* 5, The strip of 36-gage planished copper with slits cut ready for locking together. 6, Matrix locked, ready to be slipped over tooth. 7, Shows the matrix that was used in the case illustrated. Note how it was unlocked before removing.

Many cases present, both in single and double compound cavities, necessitating the restoration of one or more cusps. In nearly all such cases it is next to impossible to make a perfect pattern without employing an auxiliary matrix to confine the wax and prevent it from "mushing" out when the teeth are brought into normal occlusion.

Fig. 7.



(Case from practice.) Mesio-occluso-distal cavity; upper right first bicuspid, cuspid missing. 1, Wax cone selected for this case. 2, First step, slitting by sawing. 3, Wax form fully carved ready for cavity. 4, Temporary stopping, representing pattern.

A READILY MADE MATRIX.

The writer has employed, with a great deal of satisfaction in a large number of such cases, a very simple contrivance. A strip of No. 36-gage planished copper of proper width and length is slitted to the center on opposite sides and ends, the slits measuring about 1/16 inch or more from the ends of the strip. The strip is locked together by slipping one slit into the other and pressing down so that the edges of the band thus formed are even, thus causing the slit sides to engage the uncut sides of the strip, and forming a lock that will not give way unless sufficient force be applied to tear the metal.

The matrix is then adjusted to the tooth, and no matter what form of matrix be used for these cases, it should be adjusted loosely enough to permit an ample surplus of wax at the margins for final finishing, after the matrix is removed. Fig. 6, which is taken from a practical case, shows the various steps in the technique, Nos. 1, 2, 3, and 4 showing the steps in pattern-making, and Nos. 5, 6, and 7 the steps in making the matrix.

It not infrequently happens that an inlay is indicated in an approximal cavity, either single or double compound, when the approximating tooth is missing. In all such cases it is impossible to make a perfect pattern without employing an auxiliary matrix of some form to confine the wax, and prevent it from mushing out when the teeth are brought into normal occlusion. Fig. 7, which is also taken from a practical case and represents a mesio-occluso-distal cavity in an upper right first bicuspid, the cuspid missing, shows such a condition and the method employed for meeting it. This case is interesting in that the patient was nineteen years of age, and the cuspid was just erupting when the inlay was made.

In making patterns for approximo-occlusal cavities where the approximating root is to be crowned, a failure can easily be averted by first constructing the crown and, after placing—*not cementing*—the crown in position on the root, proceeding with the pattern-making.

Another of the same type of conditions is where we have approximating cavities facing each other, as a mesial cavity in a first molar and a distal cavity in a second bicuspid. Attempting to make patterns for both cavities by "stuffing" them full of wax and subsequently separating them by sawing or other means, usually spells failure. A more rational method consists in first filling one of the cavities with temporary stopping, and then proceeding with the pattern-making; thus, in effect, forming a fourth wall to the cavity, as is the case with the crown. It is, of course, to be very clearly understood that these cases now under consideration are of the type in which an auxiliary matrix is not indicated; these cavities could be easily manipulated if the missing tooth-structure designated were present. We simply supply, so to speak, the missing tooth-structure, with the advantage that in the case either of the crown or the temporary stopping, it can be removed, if desirable, prior to finishing the approximal portion of the pattern.

ELASTICITY OF STRETCHED WAX.

It should be noted that we tacitly express this very important principle: *In all pattern-making, have every cavity condition favoring a condensation of the pattern wax!*

Dr. Price of Cleveland first called public attention to the "elasticity of stretched wax" in an article published in the March 1911 issue of the DENTAL COSMOS, p. 265; and the writer, in an article that appeared in the same publication for June 1911, p. 664, corroborated, up to a certain point, Dr. Price's deductions. The seeming error which crept into Dr. Price's article was the inference that some cavities were irrevocably stretching mediums. It was upon that point that the writer took issue with Dr. Price, as recorded in the paper above referred to, and we trust that the foregoing technique will elucidate the reason for the positive stand taken by the author at that time. We have yet to find a cavity which, if it is not naturally so, could not be converted into a condensing medium, provided proper methods be employed throughout the entire technique.

In view of the widespread belief that pattern wax is not cohesive, it will not be surprising at all if skepticism as to the practicability of the "liquid-wax process," herein described, will be more or less pronounced. The reason for the belief, supposition, or assumption—and I am at loss to know what word would best describe the state or attitude—that melted wax will not stick to a more or less rigid mass, or, if it did appear to cohere, that the added wax would adhere to the walls of the cavity, and when the pattern is removed it would be minus the added wax, is seemingly a very "mysterious mystery." And yet how frequently the writer has encountered this proposition when describing the liquid-wax process: "Why, you cannot add melted wax to the pattern, it will scale off!" "Did you ever try to do it?" "No, but it will not stick; Dr. Skeptic said so!" Not having encountered that particular Dr. Skeptic, we cannot, at this time, give the reason for his deductions, but we suspect that it would be fully as plausible as is that of his followers. Verily, a few do the thinking for the masses!

All pattern waxes that have come to the notice of the writer are, when dry and clean, readily susceptible under all ordinary temperature conditions, to the liquid-wax process. They can be added to, built upon, or coated in any manner suggested, and it makes no difference whether the added wax be of the same formula as the wax that is added to or that of a different manufacturer. In fact, it is at times an advantage to use waxes of different colors in order to determine the thickness, location, or extent of the bulk or coating that is being laid on. A very good combination for those cases is Taggart's light green wax for the wax tray, and Consolidated black wax for the coating. Of course, waxes which are used in combination should have approximately the same physical properties.

Perhaps some day enterprising wax manufacturers will place at our disposal a variety of non-plastic wax forms suitable, with perhaps but little altering, for a large number of cavities suitably formed for cast inlays, and also waxes of different colors. This will go a long way toward eliminating many failures, and at the same time would lighten our labor and add to our efficiency.

CASTING PORCELAIN.

What has been said respecting pattern-making for cast gold inlays is equally true and forceful as to making wax patterns for cast porcelain restorations. While casting porcelain has not as high a coefficient of expansion and contraction as gold, it has neither malleability nor ductility, hence it cannot—as some operators claim to be able to do with gold—be "spun to the margins of the cavity" to hide a discrepancy in the casting, which is caused by a large shrinkage in the wax pattern and a lesser shrinkage in the porcelain. Hence the casting of porcelain should, in so far as the pattern-making and investing are concerned, be done in accordance with "a technique which makes possible a casting of the same size as the wax pattern when at normal body temperature." For it is absurd to assume and vastly more ridiculous to proclaim that castings, of either porcelain or gold, fitting the cavity perfectly, will result by following any process which does not provide a means of controlling and determining with accuracy the temperature at which the wax pattern is invested.

STATES OF WORKING PLASTICITY.

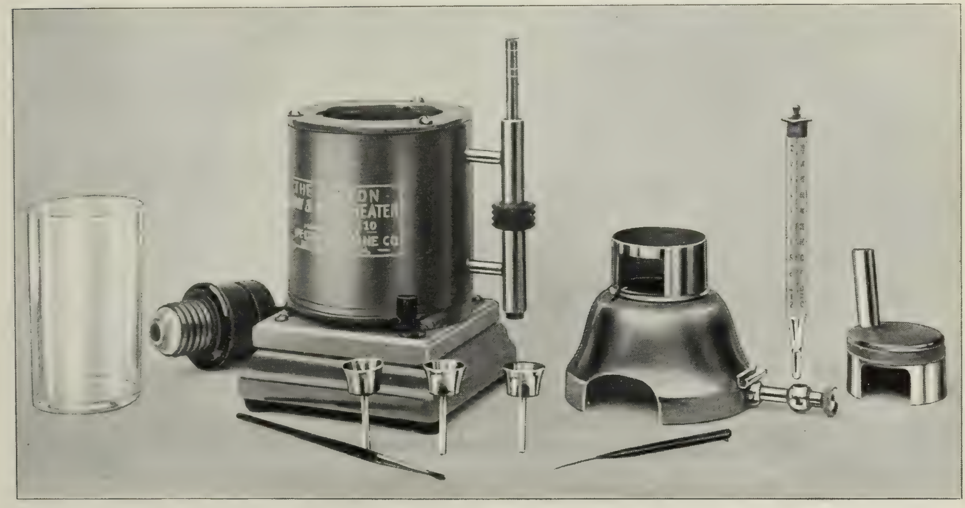
The temperature at which non-plastic pattern wax should be worked, or the state of plasticity to which it should be brought in order to meet the condition at hand, cannot be definitely stated nor accurately described, as three important considerations enter into the proposition, namely, the condition to be met, how it is met, and personal equation. Some conditions require the wax mass to be in a high state of plasticity when introduced into the moist cavity; in other cases the mass should be more resistant; and in still others the main body of the mass should be quite resistant, while the part representing the cavity surface of the pattern should be extremely plastic—fused over a naked flame to "within a hair" of the liquid state, or dipped into liquid wax. The only way in which these several states of working plasticity can be learned is by close observation in actual work in the mouth.

It is certain, however, that various states of working plasticity in the softened wax are essential; therefore the wax-softener should be so constructed that a range in temperature sufficient to meet all demands is readily obtainable; also, that melted—liquid—wax is available at all times or on short notice. Furthermore, as a wax pattern should never be sprayed with or subjected to cold water while in the tooth cavity, it would be an added advantage if our wax-softener would provide hot water, when needed, for that purpose.

THE WAX-SOFTENER.

The wax-softener devised by the writer possesses the three features just mentioned; it is quite simple in construction, and very easily operated.

FIG. 8.



Showing various parts of wax-softener.

Description. The heat is derived from the electric current through a "Pelton Water-heater No. 1," which has a rheostat giving four gradations of heat. The remodeling, etc., is done as follows:

The circular opening in the top plate is $2\frac{3}{8}$ inches in diameter; to the flange are hard-soldered, at the points of a triangle, three No. 14-gage brass wire lugs which project one-eighth of an inch into the opening. The water-glass is supported by these three lugs, thus giving a radiating space of one-eighth of an inch between the walls of the muffle and the water-glass, the glass which is used—not the one furnished with the heater—being $3\frac{1}{2}$ inches long by $2\frac{1}{4}$ inches in diameter (outside), and having a very slight taper.

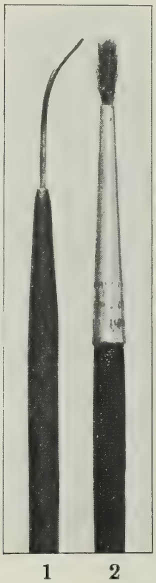
The wax cup is a small brass bell to which is hard-soldered in the center of the top a brass wire standard No. 9 gage, one inch long. Midway between the two front screws in the top plate a hole is drilled, and into it is fitted and hard-soldered a tube which projects downward; the standard of the wax cup fits loosely into the tube, the bottom of the cup resting upon the top plate, the purpose of the tube being to prevent the wax cup from tipping over.

The temperature chamber is made from the top and cap pieces of a "Horlick's malted milk" shaker. At the front, immediately over the wax cup, the lower edge of the top piece is cut away in order to give free access to the wax cup, and to admit the water syringe. An opening or doorway is cut through the cap piece and the flange over which it telescopes. At the lower left corner of the doorway is a slot which admits the handle of the wax-carrier, the latter being held in position by a spring clamp which is soft-soldered to the interior of the top piece beneath the slot. The wax-carrier is made from a Donaldson's pulp-canal cleanser with vulcanite handle.

Into a hole which is drilled in the top of the cap piece is soft-soldered a tube support for the thermometer which registers the degree of heat in the temperature chamber.

To the lower edge of the top piece at the right side is soft-soldered an arm that fits over the standard which both supports and adjusts—*i.e.* raises and lowers—the temperature chamber, the movement being effected by turning the fiber nut to the right or left. The adjusting mechanism admits of a vertical movement of 2½ inches; also, by loosening the milled knob at the end of the horizontal arm, the temperature chamber may be swung to one side for convenience in removing, replacing, or refilling the water-glass.

FIG. 9.

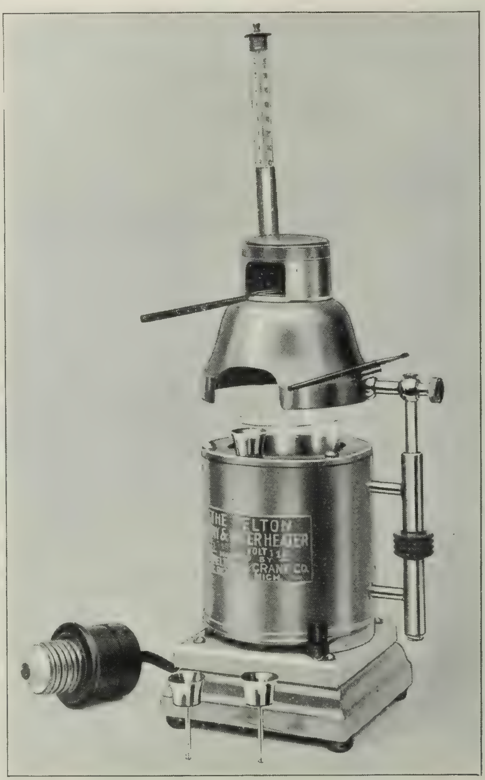


1, Wax-carrier. 2, Wax-brush.

Operation. The glass is filled with water, the wax cup placed in position, the current turned on, and the rheostat handle moved to the fifth button. When the thermometer registers about 110° F., the rheostat handle is moved back (to the left) to either the fourth or third button, depending upon the temperature that is desired. The point of the wax-carrier is heated so that it will fuse the wax, and is embedded firmly in the wax form. The door to the temperature chamber is opened by revolving the cap piece upon the flange; the handle of the wax-carrier, with its attached wax form, is placed in the spring clamp, and the door closed.

It is unnecessary to go into detail respecting temperature, as any degree which is required can be obtained, the appliance having three distinct sources of control—(1) the rheostat, (2) raising or lowering the temperature chamber, and (3) opening the door. It will readily be realized that the appliance is not submissive to any change, within reason, in voltage due to load, etc., or to variations in room temperature.

FIG. 10.



Showing wax-softener assembled.

Liquid wax is available at all times or on short notice, at the option of the operator; and by having several wax cups, different colors or kinds of wax may be used. The wax in the wax cup will liquefy at a temperature of from 160° to 170° F., with the handle of the rheostat on the third button; but if a higher state of fluidity be desired, the handle should be moved to the fourth button, which will raise the temperature of the liquid wax from 190 to 200° F.

Hot water, for spraying the pattern while in the tooth-cavity, is available at all times; also, if desired, the wax form may be immersed in hot water just prior to inserting it into the moist cavity.

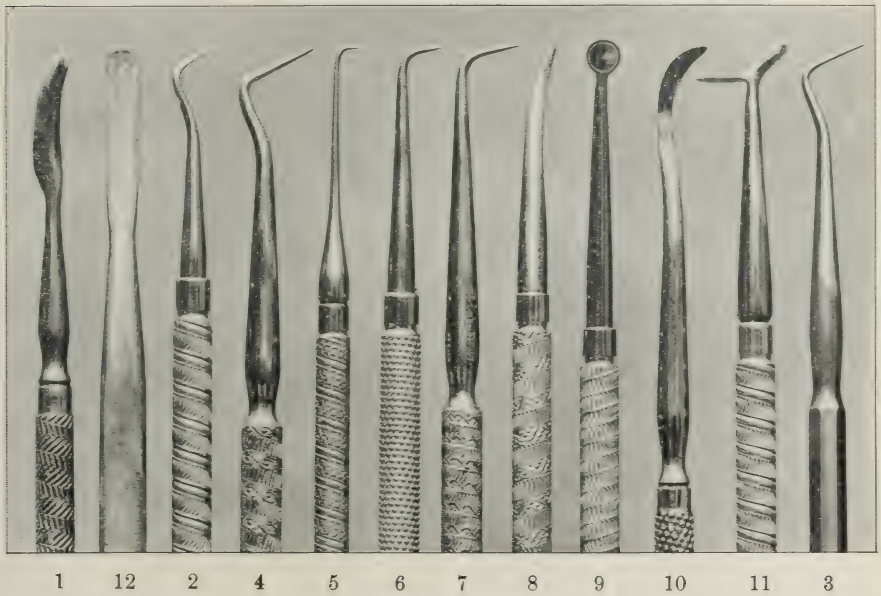
While we see no reason for softening the wax form in hot water, the appliance is readily adjustable to meet any whims of that sort.

A SET OF HOME-MADE WAX-CARVERS.

After the softened wax form is adapted to the moist tooth-cavity and the teeth are brought into normal occlusion, the wax form must be carved and polished. While carving wax patterns is an art, as was pointed out and described as to technique in a previous paper, the author's set of home-made carvers make the operation comparatively easy.

This set of instruments was made mostly from worn-out or broken excavators, burnishers, etc. The temper was drawn, and the points and shanks bent to the proper angles and ground or filed to meet requirements. They were then re-tempered and polished.

Fig. 11.



Wax-carving instruments.

HOW THE WAX CARVERS ARE USED.

No. 1 is the pet of the set and can justly be called a universal instrument, its field of usefulness being almost unlimited.

Nos. 2, 3, and 4 come next in importance. The angle of the working point, in conjunction with that of the shank, gives them a wide range. They are especially useful in carving out the embrasures and interproximal spaces.

Nos. 5, 6, and 7 are shaped like No. 6 explorers. While they are not so universal as Nos. 2, 3, and 4, they have their places in the interproximal spaces, at the margins, and in carving cusps and sulci.

The only difference in the working points of the above six instruments is in size and length.

No. 8 is a very useful instrument in reducing the surplus of the wax pattern at the cervix in cavities extending much beneath the free margin of gum tissue.

No. 9 is a large spoon, suggested by Dr. D. B. Williams, and very useful in carving cusps and sulci, and the lingual surface in incisors.

No. 10 has a very thin blade and is used to obtain the initial space prior to finishing and polishing at the contact point.

All of the above carvers have dull edges and blunt working points, which, in effect, tend to scrape rather than to cut the wax. This will be found an important feature in all wax-carvers, as a sharp point or keen edge has a tendency to "feed" into the wax, and, as a consequence, is useless in carvers.

No. 11 is a cutting instrument having a very keen edge, and is used for cutting away any large overhanging surplus.

No. 12 is a stiff spatula-shaped instrument, which is used in some cases for forcing the wax against the cervical margin, also as an auxiliary matrix. The teeth must be held firmly in occlusion when using any instrument in the interproximal space, to force the wax against the cervix.

Any dentist who desires this set of instruments can reproduce them provided he be willing to spend the little time and energy required to do so. It is decidedly easier to reproduce than it is to design or originate.*

INVESTING.

While it is not within the scope of this paper, nor is it pertinent at this time to go again into detail respecting the physical properties of wax, gold, and investing materials, it might not be amiss to refresh our memory on those points by mentioning that pattern wax is very susceptible to the physical effect of heat, a rise or fall of a few degrees in temperature meaning a corresponding change in the size of the wax mass. Normal body temperature is constant at 98.6° F.; room temperature is as variable as is the temperature of hydrant-water, and gold shrinks when passing from a fluid to a solid state.

As far as the therapeutic value of the cast gold inlay is concerned, it makes little difference whether the casting be done in a hot or a cold mold, provided the investing of the wax pattern is done under *proper thermal conditions*, and the investing material possesses the correct physical properties. No process, no materials, and no device has yet been evolved which would produce two gold castings of the same size for the same cavity, *unless those patterns were invested at the same temperature.* Therefore, no matter whether one concurs or not with the author's claims for the "expanded pattern technique," he must agree that uniformity in the relative size of dental castings demands that the wax pattern be invested at a given determinable temperature which, in effect, must be constant throughout the investing process.

PROPER TEMPERATURE AT WHICH TO INVEST.

To insure a casting that will register with the cavity margins at all points, it is necessary that the *wax pattern be invested at a temperature sufficiently above normal body temperature to compensate for the shrinkage in the gold, which is in excess of any change in the mold at the time the cast is made.* Also, the pattern must be perfectly coated with the investing material—and right here it is well to clarify an ambiguous statement which appeared in my last paper on casting, entitled "Standardizing the Investing Process and Simplifying the Casting Process," in DENTAL COSMOS, October 1911, p. 1109. On page 1114, second column, this statement appears: "Nodules or small eminences on the casting are caused, not, as is generally believed, by air-bubbles that are supposed to be contained in the investment which is poured into the flask, but rather by trapping air between the investment and the pattern when the latter is being coated." At the time that statement was made, the author was not familiar with investing materials which contain *graphite.*

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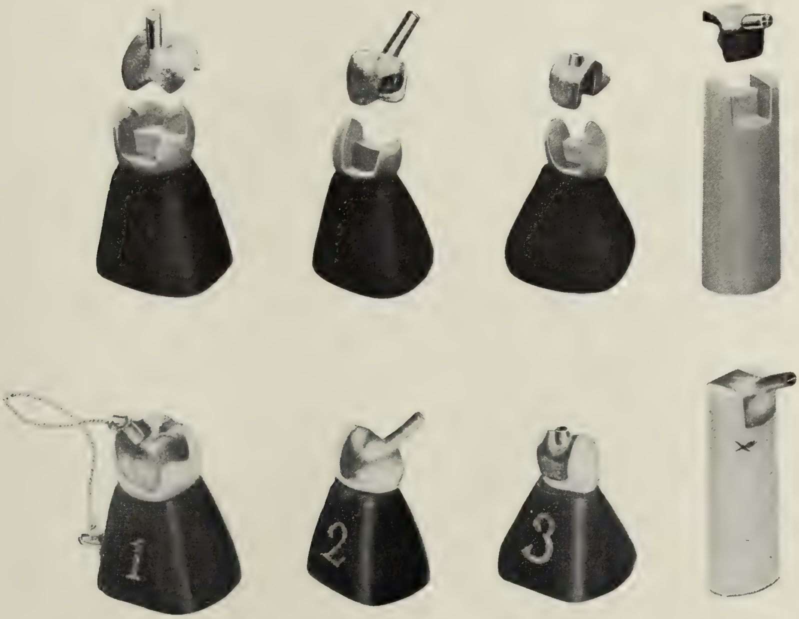
* Since reading the paper, a number of operators have requested the author to have this set of carving instruments made by a reputable manufacturer. He has therefore made arrangements with the S. S. White Dental Mfg. Co. to make them according to his patterns.

Fig. 12.



Showing inlays in position in cavities.

Outline of Technique and Materials Used: *Pattern wax,* Consolidated or Taggart's, or a combination of the two. *Investing material,* formula of L. J. Weinstein. *Gold,* 24-k. (which had previously been used for casting purposes). The patterns were made at approximately body temperature, and were invested at 108° F. (water-bath at 110° F.). After investing, the flask remained in the investing standardizer for 15 min., when it was transferred to the casting machine for drying out. Time consumed in drying out, 20 min., in volatilizing the wax and burning out resultant carbon, 15 min. Total time consumed from the moment the pattern was invested until the casting was removed from the flask did not exceed one hour for each casting.

Graphite, in the investments which have come to our notice, causes what may, for want of a better term, be called, "the gas stage." As to its cause, the writer is not positive, but suspects that, as graphite is highly porous, its air-content, owing to the smallness of the pores, is liberated very slowly and grudgingly when coming in contact with water; hence we have, with these graphite investing materials, a condition which quite frequently is responsible for nodules which have been caused, not by trapping air, but rather by this so-called "gas stage." We have retarded the setting of graphite investments for three hours, and, upon agitating them or spreading them upon a glass slab with a spatula or a brush, numerous minute air-bubbles would manifest themselves. The writer is inclined to believe that this fault in graphite investments will sooner or later be corrected, but the only remedy that seems to suggest itself at this time is the use of an investing material which does not contain graphite, if nodules on the cavity surface of the casting are to be prevented with certainty. This, however, does not signify that investing materials which contain graphite are tabooed. The fact is that graphite flakes, when properly incorporated, impart some valuable qualities to plaster-silica investment compounds; and while we cannot touch upon these properties in this paper, we trust that the discussers will feel at perfect liberty to discuss any and all points relevant to this paper or to those that have preceded it.

A technique is efficient in proportion to the perfectness of the apparatus necessary for its execution. Hence a demonstration of the efficiency of any process of dental inlay casting would, in all fairness and consistency, demand an exhibition of actual work done under the same conditions as those which surround the field of operation; which means that the wax pattern must be made in a temperature of 98.6° F. Furthermore, the casting must be shown, together with the cavity for which it was made, just as it came from the mold—that is to say, no burnishing, or spinning, or "flowing" of the gold to the cavity margins must be done; the inlay is simply cleaned with hydrofluoric acid, washed, and dried.

Fig. 12 shows castings which were made in accordance with the above, by utilizing the author's technique and appliances. They are shown just as they came from the mold, therefore one can accurately estimate the efficiency of the technique and the perfectness of the appliances when used for the purpose for which they were designed, viz, the restoration of lost tooth structure *in the human mouth* by artificial mechanical means.

CONCLUSION OF THE SERIES.

With this paper we conclude the series on the "Expanded Pattern Technique." The papers of the series appeared in the DENTAL COSMOS under the following titles in the order given: "Casting: A Review and Commentary, Including a Technique Which Makes Possible a Casting of the Same Size as the Wax Pattern at Body Temperature," vol. lii, 1910, p. 873. "Concerning Casting Methods and Casting Devices," vol. liii, 1911, p. 664. "Standardizing the Investing Process and Simplifying the Casting Process," vol. liii, 1911, p. 1109.

These papers are the outgrowth of experiments, study, and thought which were begun during September 1906, and continued up to the time of writing the present paper.

At the time the series was started, the author had a definite object in view. His experiments and studies, which were very materially aided by the writings of Drs. Taggart, Price, Lane, and others, led him to the conclusion that the casting process, as it was then practiced, was crude and unscientific, and the apparatus for the execution of the technique inefficient. It therefore seemed imperative to modify both the process and the apparatus in order to make possible a casting that would register with the margins of the tooth cavity at all points, thus reducing the burnishing at the margins to a precautionary measure, rather than making it an absolute necessity.

How this was accomplished, the technique involved, and the apparatus for its execution is fully described and illustrated in this series of papers. The important consideration remaining is the manner in which they will be received by the profession to which they are given.

Naturally, the author feels that this series of articles is a step in the right direction, but this does not imply that the last word on the casting process has been written. For, while it may be true that expanding a wax pattern and standardizing the investing process are new and original thoughts, both in the field of dentistry and elsewhere, it must not be forgotten that rarely is a process or a device perfected by the efforts of one individual. Each experimenter, each scientist, each genius, and each writer lends his touch when given full power to exercise his especial knowledge, skill, or handicraft. And so all the processes and all the appliances described by the writer are placed at the disposal of the dental profession untrammeled by patents, with the hope that our scientists and geniuses will search for discrepancies, and, if any be found, make corrections, additions, or alterations, to the end that the casting process, together with all its appurtenances, be truly scientific and eminently efficient.

PYORRHEA, ITS CAUSE AND TREATMENT.

By W. F. SPIES, D.D.S., New York, N. Y.

(Read before the Fourth District Dental Society of the State of New York, at its annual meeting, Schenectady, N. Y., November 21, 1911.)

IF dentists generally would adopt proper methods in the treatment of pyorrhea, such treatments would become part of routine practice and thousands of teeth would be saved annually.

Pyorrhea is an inflammation of the tissues surrounding the teeth. When this inflammation is slight, often little or no attention is given to it, but if it is allowed to go unchecked, destructive changes and flow of pus occur. Under given conditions this inflammation follows a certain course, just as it would elsewhere in the body. There is no doubt that in a certain percentage of cases constitutional complications influence this inflammation, but the greater majority of cases are caused by local irritants, and can be treated from a purely local standpoint.

The local causes which produce or help to produce pyorrhea may be summarized under the heads of malocclusions, faulty operative procedures, and deposits.

MALOCCLUSION OF THE TEETH.

It was once thought that malocclusions of the teeth interested only the orthodontist, but with the advance of professional knowledge it is seen that they interest all dentists. If the mechanics exhibited by the relations of one tooth to another immediately adjoining it be worthy of admiration, the relations between teeth opposed to each other are still more wonderful. Each tooth sits in a bony socket having rather frail walls; it extends a considerable distance out of this socket, and at the point of its farthest extension sustains heavy and complicated stress. When the tooth is in proper occlusion with the opposing teeth, this stress is so distributed by the occlusal planes or incisal edges that no disturbance of the supporting tissues follows. But when the tooth enters a position of malocclusion, the very forces which before supported it in health inflict injury upon it.

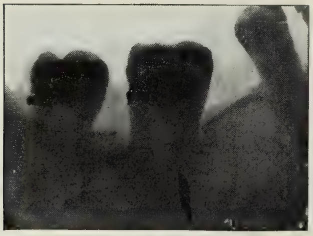
The tooth in malocclusion is generally the victim of undue lateral stress, often great in amount and frequently repeated. The effect on the lateral walls of the alveolus is felt first by the peridental membrane and then by the osseous tissues. A common result is the partial or complete absorption of the lateral wall of the alveolus. A tooth in normal occlusion may be placed in malocclusion by an improperly articulated filling or crown. The effects on the tooth are then identical with those in the malocclusion referred to before.

The effects of malocclusion are not confined to the lateral stress which a tooth receives. There is a form of malocclusion known as "excessive occlusion," in which a tooth receives more than a normal amount of opposing stress. This subjects the peridental membrane to undue pressure, the effects of which are seen in an inflammation of the peridental membrane.

FAULTY OPERATIVE PROCEDURES.

It may seem strange that operative procedures should be listed as a cause of pyorrhea, but one need not go far in the treatment of such conditions without learning that such procedures are a most important cause. A perception of the importance of proper restorations of carious or missing teeth will help many a dentist to develop the skill and patience so essential in such restorations, for he will see that much more than the mere restoration of a tooth has been committed to him, and that by observing certain phenomena he will be able to conserve the health of the mouth, while by neglect, conditions much more serious than those he undertook to remedy may be induced.

FIG. 1.

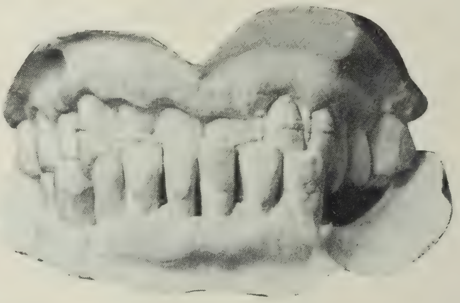


Radiograph showing loss of lower first molar and destruction of process about the second molar as a result of malocclusion.

Attention has been called to the beautiful exhibition of mechanics which nature gives in the occlusal planes of the teeth and their inter-relations. We have also seen that, by a faulty restoration of these planes, a tooth is placed in malocclusion, and inflammation of the peridental membrane is induced. The mechanics of the approximal surface of adjoining teeth are no less fine than those of the occlusal surfaces, nor is the correct restoration of lost approximal surfaces less important than the correct restoration of lost occlusal surfaces. This will be best seen from a short examination of the approximal surface of a bicuspid or molar.

If one begins his examination of such surfaces at the gum line, he will find the surface bulging anteriorly or posteriorly as it passes toward the occlusal margin. This bulging will not be uniform in character, but will be so pronounced in certain portions of the surface that when the occlusal third of the tooth is reached a distinct eminence is noted, with curved sides which slope away from it to pass into the buccal and labial surfaces. This eminence is known as the "contact point," because it is the part of the approximal surface which in the perfect denture rests in contact with the adjoining tooth.

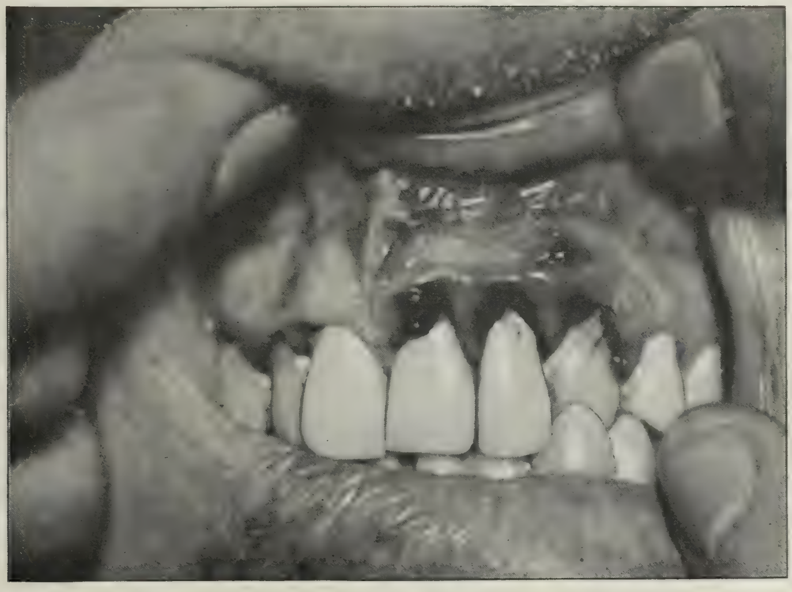
FIG. 2.



Extensive malocclusion aggravated by extraction of bicuspids and molars on lower left side and molars on lower right side. Gum tissue about the upper centrals and laterals was highly inflamed, swollen, and of a purplish red color, with extensive pockets and copious flow of pus. Gum tissue about lower incisors showed marked inflammation, with pockets and slight amount of pus. Upper centrals and laterals were extremely loosened, and were held by wire splints—as shown in Fig. 14.

There are few words in dental literature too strong to express the importance of this contact point in the preservation of the interdental papilla and of the tooth itself. In the perfect tooth, nature makes that contact point prominent and relatively sharp, with wide openings of the approximal surfaces buccally and lingually. The approximal surfaces, apically to the contact point, separate rapidly, leaving a considerable space; this space is the home of the interdental papilla. In perfect cases the papilla fills the space between the approximal surfaces of the teeth up to the contact point, and from that point slopes away palatally and buccally in such a way that food is diverted from between the teeth and thrown into the cavity of the mouth. It is the purpose of the contact point to so divide food which passes it that it shall be capable of easy diversion by the interdental papilla. When these happy conditions obtain, the soft tissues and teeth themselves remain in health with little

FIG. 3.

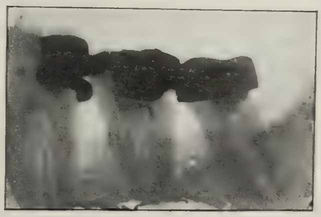


Malocclusion of canine. Inflammation began about it, became chronic, and extended to involve lateral and central. Extensive destruction of process on the labial of canine, with fistulous opening from pericemental abscess; the pulp is vital. Inflammatory condition extending to involve adjoining teeth.

FIG. 4.

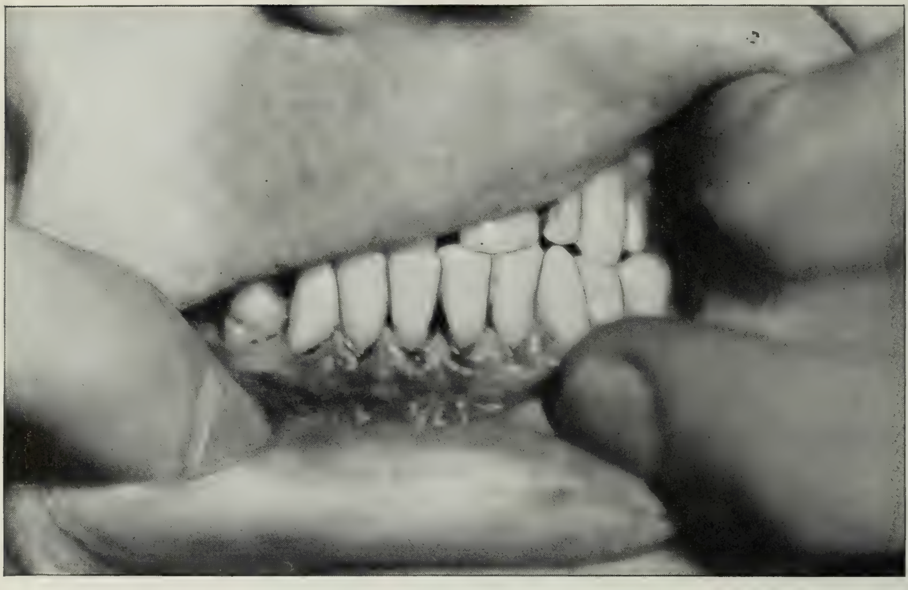
Radiograph of case shown in Fig. 3.

FIG. 5.



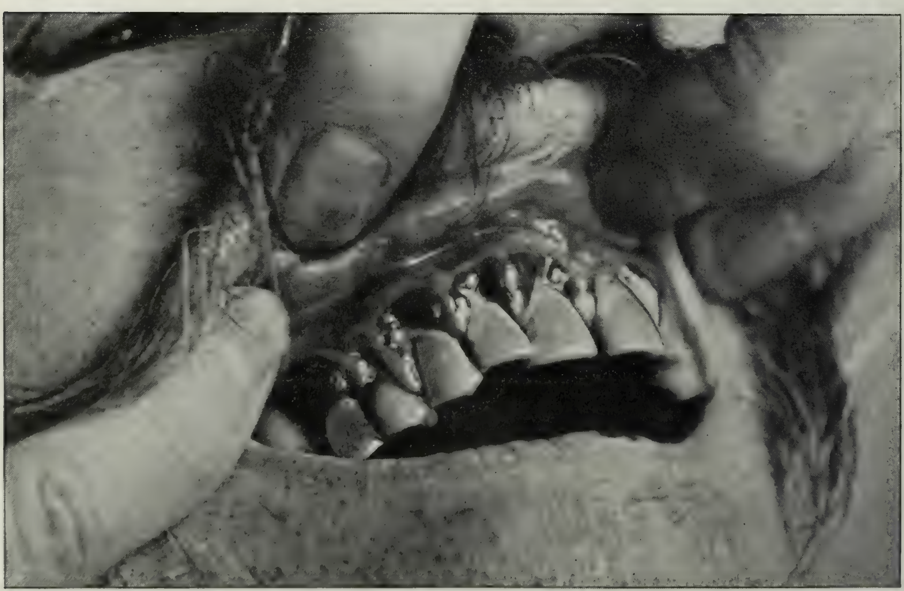
Shows crown and an approximal filling which was never finished. The excess of filling material crowding on the interdental tissue caused inflammation, with resulting destruction of process. The placing of such a filling seals the death-warrant of a tooth.

FIG. 6.



Deposit of salivary calculus beneath the free margin of the gums, with moderate amount of resulting inflammation and slight pocket formation.

FIG. 7.

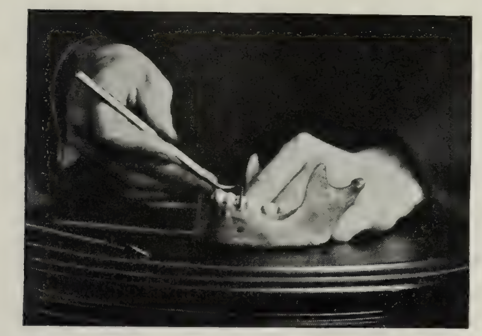


Severe inflammation as a result of salivary deposits; extensive pocket formation; great amount of pus; teeth extremely loose. This and the preceding illustration show the beginnings and possible extent of inflammation resulting from salivary deposits.

care from the dentist. But when this ideal arrangement is lost, when the contact point is not properly formed, and the embrasures are narrow, food passing the contact point is not sufficiently divided for the interdental papilla to be able to divert it. It crowds down into the interdental space, and the effects are disastrous.

When the dentist is called on to restore an approximal surface of a tooth he cannot have too clear a conception of these functions of the contact point, and of the necessity of restoring it, if the tooth is really to be preserved. He will find, in the restoration of a contact point of proper form, opportunity to exemplify the highest degree of skill he may possess.

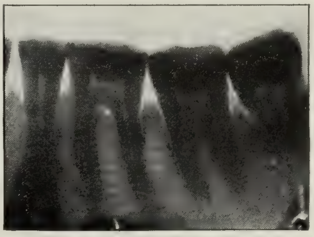
Fig. 8.



Instruments, to do effective work in the removal of deposits, should be so designed that the cutting edge shall work on the long axis of the tooth, the blade having two points of contact—the cutting edge and some portion of the inner surface of the blade, the blade in such relation to the handle as will admit of the use of the incisal edge of the anterior teeth as a point of rest. An instrument designed to reach one surface, using full width of the cutting edge and utilizing the incisal edge of the anterior teeth as a rest, cannot do effective work on another surface with only the corner of the cutting edge in contact, rather than its full width. It requires the use of six instruments to go about the entire circumference.

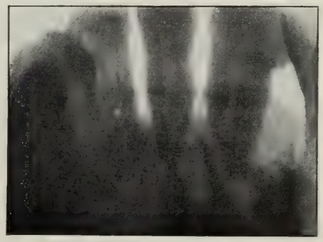
It will not, however, be sufficient to have the contact point of proper form and in proper location. The filling or crown must be of such shape as will restore the natural form of the approximal surface of the tooth, to permit the preservation of the interdental papilla. The filling or crown should pass into the surface of the root with such perfect smoothness as to produce not even the slightest irritation upon the soft tissues.

Fig. 9.



This shows the supporting bony tissue which surrounds the tooth nearly up to the enamel line, as between the first and second molars. The tooth is held firmly in place by the peridental membrane, which is attached to the root on the one side and to the supporting bony tissue on the other.

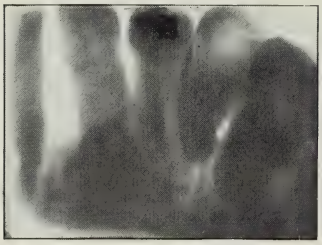
Fig. 10.



The dark areas indicate presence of bone. Light areas indicate absence of bony tissues. Two-thirds of the supporting bony tissues about the right central and the lateral have been destroyed, permitting excessive movement and preventing the establishment of healthy conditions. The teeth were held firmly by a splint made of a series of bands, and healthy conditions established by proper treatment.

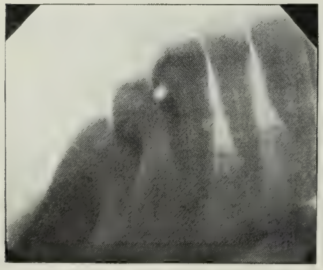
Only too often this is not the case. The filling or crown may present a perfect occlusal surface and even a contact point, but the reproduction of the approximal surface may be very poor, and the edge of the crown or filling may be so imperfectly adapted to the tooth as to leave a margin which is a constant source of irritation. The pyorrhea worker is early impressed with the frequency of cases in which the adaptation of the crown or filling at the cervical margin is so poor that irritation of the soft tissues results.

Fig. 11.



Same case as shown in Fig. 10; the left side of the upper jaw. Central partly shown on extreme left. Lateral had been lost through pyorrhea. The splint mentioned before had extended from canine to canine.

Fig. 12.



The lateral shown was loosened by the loss of supporting bony tissue and the relaxation of the surrounding soft tissue. It became firm without the aid of a splint by reducing the inflammation and the constriction of the soft tissues about the root. It is not always necessary, by any means, to make use of splints—only in those cases where extensive bone destruction has taken place.

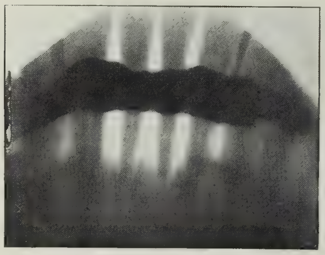
So serious are the results of such faulty restorations that they cannot be overlooked, and must be corrected in the treatment.

DEPOSITS.

Deposits differ in kind and in location, and may be divided into plaques, soft deposits, and salivary deposits. The direct result of the action of these irritants is the beginning of inflammation.

It might be thought that deposits composed of food débris would have little or no effect on tissues apparently so resistant as those of the gums. But experience proves that when even soft deposits exert a continuous pressure, the gums yield before it. The chemical influence of soft deposits results from their fermentation. No sooner is the food lodged than it becomes the object of attack by the micro-organisms inhabiting the mouth. Its original character is soon lost, and it becomes a pabulum hardly less fruitful in the feeding and production of bacteria than the agar which the scientist uses in his laboratory. All the environment is favorable for the activity of the micro-organisms. The deposit affords food in plenty; the mouth is moist and warm.

Fig. 13.

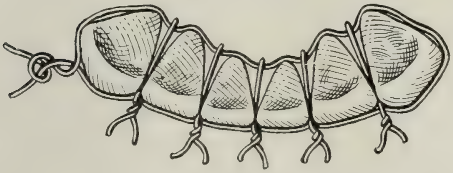


Nearly all of the supporting bony tissues about the centrals have been destroyed. A temporary splint of wire was attached, the deposits removed, and healthy conditions established. A removable splint was then attached. The splint was made by casting a piece for the lingual surface and one for the labial surface. They were attached by the use of a bolt with a Bryant nut between the lateral and canine on each side.

SALIVARY DEPOSITS.

For practical purposes, salivary deposits may be divided into two kinds. One of these is yellowish in color and is deposited in large quantities at or near the opening of the ducts of the salivary glands. It is confined to that portion of the tooth projecting above the gums, and in some mouths forms very rapidly. It may be removed without much difficulty, because, owing to the rapidity of formation, it is not so dense as the more slowly forming variety.

FIG. 14.

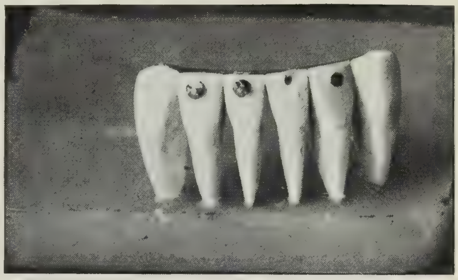


Shows a form of temporary wire splint. It is made by using No. 26-gage gold ligature wire for the slip-noose and No. 30-gage for the wires between the teeth. Make a slip-noose over the teeth to be inclosed by bringing one end of the wire over the other, but not twisting them together. Cut short pieces of wire to be used between each two teeth, twist the ends together, and draw tight. These wires should be cut to such length that the ends may be turned back into the interproximal space without touching the gum tissues. The ends of the wire of the first slip-noose should now be twisted together.

The second variety of salivary calculus is so different in character that it might easily be mistaken for another form of deposit. It is much darker in color, is less in quantity, and is much more dense, owing to the fact that it is deposited more slowly. This variety is found underneath the free margins of the gums; sometimes it entirely encircles the tooth.

While nothing really conclusive concerning this variety of deposit has been worked out, it seems reasonable to suppose that the slight deposits of food and other materials which can nearly always be found underneath the free margins of the gums serve as a starting-point for the deposit of calcium salts. If a prophylactic file be inserted beneath the free margins of the gums, it can usually be withdrawn fairly well filled with a soft deposit, probably composed of broken-down food material, bacteria, tissue cells, etc. This deposit occupies the area which, unless the teeth are given prophylactic treatment, will probably be occupied by the deposit of dark salivary calculus.

FIG. 15.



Permanent splint holding four lower incisors. Attachments to canines may be made by devitalizing these and making use of posts, inlays, or by putting bolts through from labial to lingual. A piece is cast for the lingual surface and occupying a position near the incisal edge. Holes are drilled through the natural tooth and cast piece. Bolts are made of iridio-platinum wire, No. 20 gage, and threaded to take a gold nut. Gold nuts shown unfinished on right central and lateral. Gold nut finished down in left lateral.

DEPOSITS ON THE ROOTS.

The deposits on the roots of the teeth differ from salivary deposits in amount, in color, and in origin. They may occur in small patches or in a thin layer, which may extend about a considerable portion of the root. They are never found in masses, as is generally the case with salivary calculus.

TREATMENT.

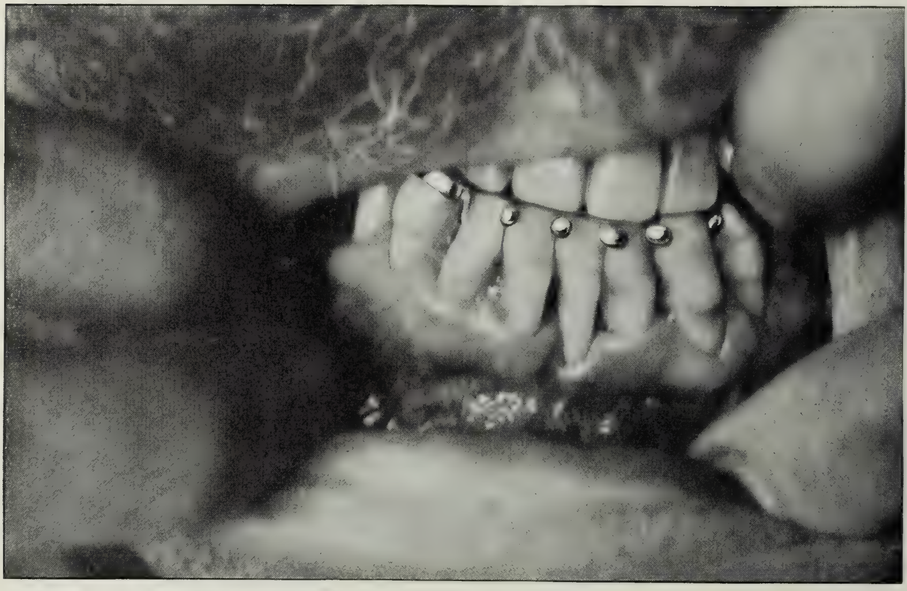
Proper treatment consists of the removal of irritants, medicinal and mechanical assistance, and home treatment by the patient.

The removal of the deposits from the

root can be accomplished with no greater labor than is expended on other dental operations, and with probably greater resultant satisfaction to both dentist and patient.

The selection of the instruments to be used in treating pyorrhea depends somewhat on the operator, but there are a few fundamental facts which must be borne in mind. The instruments for this work should be made thin, but with ample strength at those points where strength is needed. If an instrument is bulky, it is difficult to introduce it into a pyorrhea pocket; furthermore, bulky instruments are unnecessary. It is of the greatest importance that the angles exhibited by the instruments shall permit the operator to make use of the full width of the cutting edge on all surfaces of the tooth, for only by utilizing this full width can the operator leave the surface of the root smooth and avoid the cutting of grooves. These angles should permit the use of the anterior teeth as a fulcrum, and still afford the operator that range of movement which will enable him to reach all parts of the tooth and remove the deposits. The advantage of being able to use the anterior teeth as a fulcrum will be evident, since it gives the operator a power and confidence which he might otherwise lack, and prevents laceration of the soft tissues.

FIG. 16.



The illustration shows part of a permanent splint which extends from the second bicuspid on the right side to the first molar on the left side. Firm attachment was secured in the bicuspids and molar by use of inlays with pins. V-shaped spaces were cut between all of the anterior teeth near the incisal edge to allow for sufficient metal for strength. Impression taken and model made of Price's artificial stone. Casting made directly on model. The gold buttons will be noted in illustration showing as white spots between the teeth. The gold buttons prevent the rotation of the teeth and hold them securely.

The question often arises in the dentist's mind as to the advisability of endeavoring wholly to relieve the inflamed condition about one tooth before treating others. In general, it may be said that in cases where several teeth are affected, it is better to remove the greater part of the deposits on each of the teeth, thus giving the patient general relief more quickly. When the general condition of the mouth shows improvement, the operator may give each tooth that minute attention which successful treatment demands. This attention will be the more easily given because, wherever deposits remain, irritation of the gum tissues will be visible.

Fig. 17.

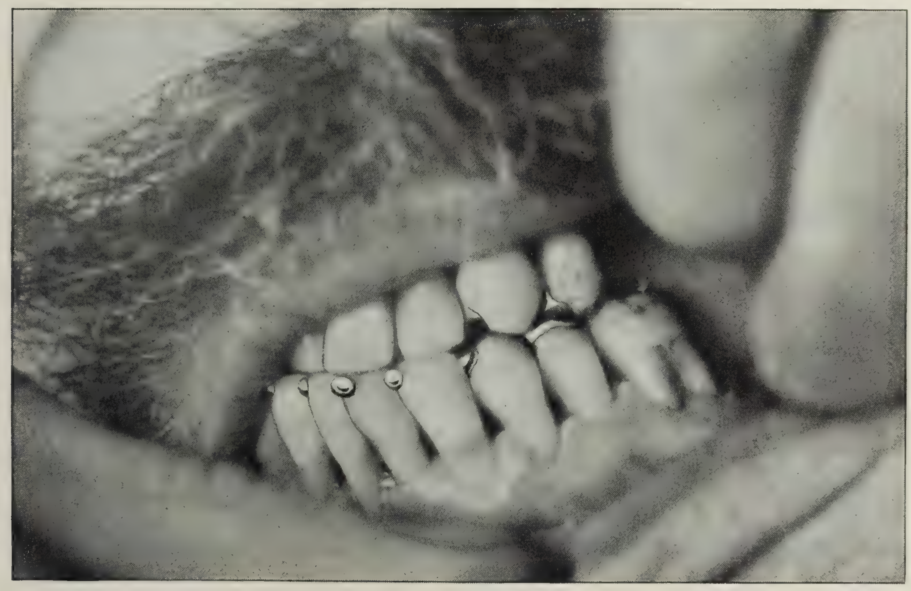


Fig. 17 illustrates the same case as Fig. 16, showing buccal surface of lower left side.

During the instrumentation, the greatest care should be exercised not to lacerate the soft tissues, not only out of consideration of the patient's feelings but because each laceration opens up new avenues of infection, and retards the process of repair. The instruments should be passed alongside the root and in contact with it, until the bottom of the pocket is reached. With an upward pull-out movement, the deposits may be removed. During this use of the instruments, the importance of proper angles between handles and blades is made apparent. With proper angles the blades will lie alongside the root and plane off the deposits without gouging the roots or lacerating the soft tissues. With improperly-angled instruments, both these unfortunate actions will be uncomfortably common.

Having secured the proper instruments the dentist will do well to give them proper care. The first step in this care is to keep them sharp. The cutting edges should be kept sharp by frequent attention, rather than be neglected until no semblance of a cutting edge remains. This maintenance of sharp edges is the first requisite of humanitarian work. It also rewards the operator by enabling him to do more and better work in a given length of time. So distinctly worth while is the maintenance of a proper edge that the essayist has long made it a habit to examine the edge with a magnifying glass and make sure that it has been sharpened with an even bevel.

The realization of the dangers to which insufficient sterilization of instruments exposes both patient and operator should be a guarantee for the careful sterilization of each instrument just before use. To this end, boiling is absolutely essential, since mere immersion in any antiseptic solution is not sufficient to meet the requirements.

MEDICINAL ASSISTANCE.

The proper function of medicinal assistance in the treatment of pyorrhea is the restoring of tone in diseased tissues, and it is used before and following instrumentation. This healthy tone is produced by three properties in medicinal agents, viz, antiseptic, astringent, and stimulating. The clinical success of Dentinol is due to the fact that it exercises these three characteristics in a most effective manner. By its antiseptic effect it overcomes the germ life characteristic of pyorrhea, without any injurious effect on the human tissues. He who hopes for the greatest success in treating pyorrhea must carefully avoid the use of agents which are injurious to weakened tissue.

Its astringent action aids in so changing the exudates that they can be taken up by the circulatory system, when that has been sufficiently stimulated. These benefits are not confined to the cells lying near the surface treated, but are also exerted deeply within the tissue, owing to the penetrating property of its ingredients. It does not form a chemical union with the cell contents, only acting as a stimulant, leaving the cell to perform its functions with increased vigor. If it were to form chemical union with the contents of cells, this would mean ultimate cell destruction, an end to be avoided.

Very often we find the gums painful when an attempt at removing the deposits is made, and to do this thoroughly at the first visit of the patient would be impracticable. In these cases our treatment should be palliative, preparing a better field for operation by reducing the soreness. To secure the best results, the exposed tissues are washed and the pockets irrigated with warm sterile water. Dentinol is then applied to the exposed tissues on cotton, and in the pockets with a syringe. The use of the syringe insures the liquid being carried to the bottom of the pocket, promoting the healing and repairing of the tissue from that point, as well as near the opening of the pocket.

After the deposits have been removed from the root, the "nursing stage" in the treatment of the pocket commences. Treatments are continued every third day until the pocket has closed. This treatment consists of cleansing the pockets and of medicinal assistance to aid nature in the repair of the tissue. The gum tissue becomes more dense and constricted about the root.

Patients treated for pyorrhea should receive occasional attention from the dentist. This attention by the dentist is determined by the diligence of the patients in their co-operation, and in the home treatment prescribed for them.

HOME TREATMENT BY THE PATIENT.

Experience has clearly shown that unless intelligent home treatment is conducted by the patient, the dentist's treatments will be much less effective, and perhaps unsuccessful. Instructions as to the proper use of the tooth-brush should be given to the patient. The value of the Pyorrhocide powder used as a dentifrice should not be overlooked, as it combines modified Dentinol with white oak, peruvian and elm barks, and precipitated chalk. By its use the gums receive suitable daily stimulation, and the teeth are kept free from the deposits which delay healing, and which will cause a recurrence of inflammation.

SPLINTS.

When teeth have been so affected by pyorrhea as to be extremely loose, the use of a properly designed splint gives rest to the individual teeth, avoids irritation from excessive movement, facilitates healing of the tissues, and makes available for mastication the combined strength of the teeth involved. Frequently by this method the operator may save teeth which it would otherwise be necessary to extract.

The possibility of such splinting should always be carefully considered before loose teeth are extracted, lest it be discovered after the teeth have been extracted that no other form of substitute can be made successful and comfortable.

Splints may be temporary or permanent. Temporary splints are those which are applied during treatment for the purpose of giving rest and of determining whether or not the teeth will become sufficiently firm to remain healthy when unsupported.

Permanent splints should be decided on when the loss of bony tissue is so extensive that the teeth cannot remain firm when unsupported. It should be remembered that excessive motion of a tooth in its socket will induce inflammation of the surrounding tissues—and this is pyorrhea. It is essential, therefore, that teeth which are to remain healthy and useful shall be supported against excessive motion in the sockets. The form of a permanent splint will necessarily be determined by the conditions.

CONCLUSION.

The dentist who develops a pyorrhea practice will enhance his reputation, enlarge his *clientèle,* elevate his procedure, and increase his income.

It cannot be expected that members of the public who are unacquainted with the possibilities of pyorrhea treatment will be enthusiastic on the subject until their knowledge of the benefits to be received has been increased. But any patient of ordinary intelligence may be educated to the necessity for treatment which will prevent pyorrhea, alleviate or cure it when present, and can be inspired with enthusiasm as the work progresses.

This subject affords opportunity for some of the most convincing educational arguments which it falls within the dentist's province to give. Time spent in presenting these considerations to patients in need of such treatment will be found, in the end, to be well invested. Not every person can be interested, yet the time given to those who are never won may be regarded as very well spent, because the number of appreciative patients will be steadily increased.

STOCK VACCINES IN THE TREATMENT OF PYORRHEA ALVEOLARIS.

(Experiments conducted in the Clinics of the Ohio College of Dental Surgery.)

By W. H. O. MC GEHEE, M.D., D.D.S., Cincinnati, Ohio.

An examination of the literature published on the subject of vaccine therapy in the treatment of oral infections reveals the fact that the majority of a small number of investigators who have reported results are advocating the use of autogenous vaccines. Chief among these is Dr. G. D. Laymon of Indianapolis, who has recently read a paper before the Northern Ohio Dental Association, setting forward his views in regard to this subject.

I was impressed, before beginning the experiments recorded in this paper, with the idea that the use of autogenous vaccines could never become a universal practice in the dental profession—neither has it become universal in the medical profession—owing to the difficult technique incident to the taking of the opsonic index and the cultivation of the germ. The great majority of dental practitioners will never have the time, inclination, technique, or equipment for establishing and maintaining this work in their daily practice.

This being the case, I felt convinced that if the adoption of vaccine therapy in the treatment of oral infections was ever to be realized to any great degree, it would necessarily have to come through the use of a stock vaccine. I do not intend to decry the use of autogenous vaccine by those who are equipped with the necessary apparatus, and who by experience have developed the necessary skill in its utilization, but, for the reasons just given and after having obtained the results recorded in the following, I feel justified in advocating and recommending further investigations and experiments in the use of stock vaccine.

During the past winter I have treated thirty cases of pyorrhea, in addition to a number of cases of abscess and other septic oral conditions, using the stock vaccine exclusively, and the majority of these cases have shown improvement upon its use.

For the experiments here recorded, a polyvalent vaccine known as VanCott's was utilized. This combination, originated by Dr. J. M. VanCott of the Long Island Hospital College, consists of a mixture of attenuated cultures of the following organisms, viz, streptococcus, staphylococcus pyogenes aureus, albus, and citreus, bacillus coli communis, and the pneumococcus. This vaccine was selected for the experiments because it contains the micro-organisms which are supposedly largely responsible for the infections present in pyorrhea. It was furnished by Messrs. Parke, Davis & Co. The form utilized in these experiments was the 1 cc. bulb, each bulb containing the following combination:

Streptococcus, 50,000,000.
Bacillus coli communis, 100,000,000.
Pneumococcus, 100,000,000.
Staphylococcus (combined aureus, albus, and citreus), 500,000,000.

in 1 cc. physiologic salt solution.

The experiments were begun by selecting a class of eighteen patients, all exhibiting symptoms of pyorrhea of the first variety (Burchard's classification)—viz, pyorrhea alveolaris beginning as a marginal gingivitis—the cases being as nearly similar as to symptoms as possible. These eighteen patients were placed in three classes as follows:

Class I. Six patients. To this class was given the routine local, and, when considered advisable, constitutional treatment, *without the administration of the vaccine.*

Class II. Six patients. These were given injections of the VanCott vaccine *without the usual local or constitutional treatment.*

Class III. Six patients. To these were administered the *combined vaccine and dental treatments.*

Four subcutaneous injections of the vaccine in 0.5 cc. doses were made in the extensor surface of the forearm by means of an ordinary hypodermic syringe under the usual aseptic precautions, at intervals of one week. A few of the patients exhibited local soreness at the point of injection, together with stiffness and swelling of the arm and some constitutional disturbance, but in the majority of cases no apparent disadvantageous results were noticed.

An examination of the appended tables discloses the fact that in one case no apparent results, either positive or negative, were noticed from the use of the vaccine. Two cases exhibited disadvantageous local and constitutional disturbances; in one of these cases, therefore, the treatment was discontinued at the request of the patient. Eight cases gave positive results; three of these seemed to respond markedly to the treatment.

Very little response was expected from class II, and very little was really obtained, although slight improvement in gum color and tone, with slightly diminished bleeding and pus flow, was noted in four of the cases, giving a ratio of 66⅔ per cent. improvement in this class. Markedly better results were accomplished in class III than in class I or II, four of the cases in this class responding, giving a ratio of 66⅔ per cent. of successes, with a total ratio from the two classes of 66⅔ per cent. of successes.

In studying the clinical phenomena exhibited by the above three classes of patients, it was thought that the injections were possibly being made at too great intervals. It was found that reaction to the application of the vaccine seemed to be positive up to about the end of the third day, when a negative phase occurred, lasting until the next injection was made, when after twenty-four hours a positive reaction again occurred. In addition to this, owing to the exhibition of local swellings and some constitutional disturbance in several cases, the thought suggested itself of beginning with smaller doses and gradually increasing the amount administered.

With this idea in view, another class of six cases was selected, exhibiting the same symptoms as mentioned in the previous cases experimented with. These patients, in conjunction with the routine dental treatment, were given injections of 0.25 cc. of the VanCott vaccine at inter-

(I.)

Local and Constitutional Treatment Alone—No Vaccines Used.

Class I	1st Treatment	2d Treatment	3d Treatment	4th Treatment	5th Treatment	6th Treatment	7th Treatment	8th Treatment	9th Treatment	10th Treatment	Results
Case No. 1	+	+	+1	+1	+2	+2	+3	+3	+4	+4	Dismissed as cured.
“ 2	+	+	+	+1	+1	+1	+2	+2	+2	+3	Positive.
“ 3	+	+	+	+	+	+1	+1	+1	+2	+2	Improved.
“ 4	+	+	+1	+1	+1	+2	+3	+3	+3	+4	Dismissed as cured.
“ 5	+	+	+	+1	+1	+2	+2	+3	+3	+4	“ “ “
“ 6	+	+	+	+	+1	+1	+1	+2	+2	+2	Improved.

(II.)

Vaccine Treatment Alone—No Local Treatment Employed.

(Dose 0.5 cc.)

Class II	1st Injection	2d Injection	3d Injection	4th Injection	Results—66.66 per cent. of successes
Case No. 1	–	+	+	+1	Less pus discharged. Gums slightly improved in color and tone. Teeth slightly tighter in alveolus. Positive results.
“ 2	–	+	+	+	Diminished bleeding. Less soreness. Swelling diminished. Pus discharge slightly improved. Positive results.
“ 3	–	–	–	–	No apparent results.
“ 4	–	–	+	+	After first treatment soreness at point of injection. Stiffness of entire arm, disappearing in a few days. Slight improvement in gum color. Diminished bleeding. Positive results.
“ 5	+	+	+1	+2	Quite apparent improvement as far as pus discharge and color and tone of gum tissue are concerned. Positive results.
“ 6	–	–	Discontinued	..	Marked soreness at point of injection. Stiffness of arm. Swelling of lower limbs, weakness, depression. Patient refused further treatment. Results negative.

(These cases were afterward given routine dental treatment.)

(III.)

Combined Local, Constitutional, and Vaccine Treatment.

(Dose 0.5 cc.)

Class III	1st Injection	2d Injection	3d Injection	4th Injection	Results—66.66 per cent. of successes
Case					
No. 1	+	+	+	+	Improvement noted in conditions. Case not cured; pus still present. Vaccine results apparently negative. Improvement attributed to dental treatment. Results negative.
" 2	+	+1	+2	+3	Cured—Vaccine markedly effective in hastening cure. Results positive.
" 3	+	+	+1	+2	Vaccine results positive. Marked results, though only after bismuth paste injections. Results positive.
" 4	+	+1	+2	+3	Vaccine results positive.
" 5	+	+	+1	* +2	* Vaccine discontinued. Results attributed to local treatment. Vaccine apparently harmful. Local disturbances at point of injection. Swelling, chills, constitutional disturbances. Results negative.
" 6	+	+1	+2	+3	Cured—Vaccine markedly effective. Results positive.

(IV.)

Combined Local, Constitutional, and Vaccine Treatment.

(Dose 0.25 cc., increased to 0.5 cc. Four-day intervals.)

Class IV	1st Injection	2d Injection	3d Injection	4th Injection	5th Injection	6th Injection	7th Injection	8th Injection	Results—83.33 per cent. of successes
Case									
No. 1	–	–	+	+1	0.5 cc. +2	0.5 cc. +3	Discontinued	. .	Positive.
" 2	–	+	+1	0.5 cc. +2	0.5 cc. +3	0.5 cc. +4	0.5 cc. +5	Discontinued	"
" 3	–	–	0.5 cc. –	0.5 cc. –	0.5 cc. –	Discontinued	. .	. .	Negative.
" 4	–	–	+	+	0.5 cc. +1	0.5 cc. +1	0.5 cc. +2	0.5 cc. +3	Positive.
" 5	–	+	+	+1	0.5 cc. +1	0.5 cc. +2	0.5 cc. +2	0.5 cc. +3	"
" 6	–	–	+	0.5 cc. +1	0.5 cc. +1	0.5 cc. +2	0.5 cc. +3	Discontinued	"

(No constitutional disturbances.)

vals of four days, the dose being later increased to 0.5 cc., some patients receiving six, some seven, others eight injections. In none of these cases were any local or other untoward results noted, all of them with the exception of No. 3 seeming to respond to the vaccine. In this latter case no results, either positive or negative, seemed to be obtained from its use, although improvement was accomplished, this being attributed to the local treatment administered. In this class, then, positive results were attributed to the vaccine in five of the cases, giving a ratio of 83⅓ per cent. of successes.

Chart No. 5 shows the results obtained in another class of six patients who had never responded to any great degree to persistent dental treatment given at intervals for three years previously. In these cases initial injections were given of 0.25 cc. doses at four days' intervals, which were later increased to 0.5 cc. doses, and in four of the cases finally to 1 cc. In none of these cases were any disadvantageous results obtained, although three of them were finally abandoned owing to seeming non-response to the vaccine. The reaction in cases Nos. 2 and 6 was surprisingly marked and very gratifying. In this class a ratio of 50 per cent. of successes was recorded, and the results obtained were all the more gratifying when it was realized that they could undoubtedly be attributed to nothing else than the vaccine, as the usual dental treatment had previously always been discouraging as to results.

(V.)

COMBINED LOCAL, CONSTITUTIONAL, AND VACCINE TREATMENT—CASES IN WHICH ROUTINE DENTAL TREATMENT HAD BEEN TRIED WITH POOR OR NEGATIVE RESULTS.

(Dose 0.25 cc., increased to 0.5 cc., and in four cases to 1 cc. Four-day intervals.)

CLASS V	1st Injection	2d Injection	3d Injection	4th Injection	5th Injection	6th Injection	7th Injection	8th Injection	RESULTS—50 per cent. of successes
Case No. 1	0.25 cc. –	0.25 cc. –	0.5 cc. –	0.5 cc. –	0.5 cc. –	0.5 cc. –	1 cc. –	1 cc. –	Negative.
" 2	0.25 cc. –	0.25 cc. +	0.5 cc. +	0.5 cc. +1	0.5 cc. +1	0.5 cc. +2	0.5 cc. +3	0.5 cc. +4	Positive.
" 3	0.25 cc. –	0.25 cc. –	0.25 cc. –	0.5 cc. +	0.5 cc. +	0.5 cc. +1	0.5 cc. +1	0.5 cc. +2	"
" 4	0.25 cc. –	0.25 cc. –	0.5 cc. –	0.5 cc. –	0.5 cc. –	1 cc. –	1 cc. –	Discontinued	Negative.
" 5	0.25 cc. –	0.25 cc. –	0.5 cc. –	0.5 cc. –	1 cc. –	1 cc. –	Discontinued	. .	"
" 6	0.25 cc. –	0.25 cc. +	0.25 cc. +1	0.5 cc. +1	0.5 cc. +1	1 cc. +2	1 cc. +3	1 cc. +4	Positive.

TABULATED RESULTS.

Class II.	Positive results	....66⅔	per cent.
" III.	" "	....66⅔	"
" IV.	" "	....83⅓	"
" V.	" "	50	"

Total percentage of successes, 66⅔.

With the above tabulated results before me I feel justified in recommending to the dental profession the utilization of stock vaccine in the treatment of pyorrhea. The injections should be begun in small doses (usually 0.25 cc.) and later increased to 0.5 cc., and even to 1 cc. in special cases, being administered at intervals of four days.

Those members of the profession who are so situated that they can conveniently have autogenous cultures made for them may prefer doing so, and we must admit that from a standpoint of rational therapeutics the use of autogenous vaccines is the ideal procedure; but for the great body of the profession, to whom the use of autogenous vaccines is certainly for the present an impossibility, the stock vaccine is undoubtedly a boon, and will be found a valuable aid in oral therapeutics to those who use it intelligently.

EFFECTS UPON THE TEETH OF THE ADMINISTRATION OF IRON, ACIDS, ETC., AND THE PRECAUTIONS TAKEN BY PHYSICIANS TO AVOID INJURY TO THE ENAMEL.

By **E. B. PRENTISS, D.D.S.,** New York, N. Y.

(Report of Correspondent of the New York State Dental Society, read at Albany, N. Y., May 9, 1912.)

THE subject selected for a report by your Correspondent this year is the "Effect Upon the Teeth of the Administration of Iron, Acids, etc., and the Precautions Taken by Physicians to Avoid Injury to the Enamel." I have attempted to discover, also, which preparations are most commonly prescribed today, and whether it is not possible to make use of some more certain method of keeping such preparations from coming in contact with the teeth.

INQUIRY REGARDING THE SUBJECT SELECTED.

The following letter has been sent to about forty of the most prominent physicians throughout this country, as well as a few in Europe:

My dear Doctor,—In my official capacity as Correspondent of the New York State Dental Society, I am taking the liberty of addressing this letter to you.

You will be rendering a distinct service to our society as well as to dental science in general by giving us your personal clinical experience in regard to the following subjects:

(1) What injurious effects, if any, do the various forms of iron, as administered internally, have upon the teeth?

(2) Which forms are most commonly administered?

(3) Which forms are most injurious to the teeth?

(4) When administering solutions of iron, what precautions do you take to avoid injury to the teeth?

(5) In your opinion, would it be possible to give the most necessary preparations of iron in pill, tablet, or capsule form?

(6) Do you know of any other practical way in which these remedies may be kept from coming in contact with the teeth?

(7) In administering acids internally, what precautions do you observe to keep them from coming in contact with the teeth, and is there no known way of preventing such contact?

Will you kindly make your reply on the separate inclosed sheet, where you will find a duplicate of the foregoing questions, with spaces for your remarks?

An early answer will be greatly appreciated, in order that I may incorporate it in my report to be given at the annual meeting of the State Society in May.

Thanking you in advance for any information you may be able to give, I am,

Yours very truly,
E. B. PRENTISS.

REPLIES FROM MEDICAL AUTHORITIES.

I have received replies from twenty-one, whom I have listed below:

Dr. Wm. Osler, Oxford, Eng.
Dr. A. K. Austin, Paris, France.
Dr. A. Jacobi, New York.
Dr. Jas. Tyson, Philadelphia.
Dr. Jas. Priestly, Des Moines.
Dr. A. Stengel, Philadelphia.
Dr. Philip Marvel, Atlantic City.
Dr. Theodore Janeway, New York.
Dr. F. C. Shattuck, Boston.
Dr. H. A. Hare, Philadelphia.
Dr. W. Gilman Thompson, New York.
Dr. Beverly Robinson, New York.
Dr. Walter A. Bastedo, New York.
Dr. E. A. Vandeveer, Albany.
Dr. Geo. R. Butler, Brooklyn.
Dr. John Ruhrah, Baltimore.
Dr. Henry Hun, Albany.
Dr. Frank Billings, Chicago.
Dr. L. Pierce Clark, New York.
Dr. J. C. Wilson, Philadelphia.
Dr. S. B. Ward, Albany.

I also have replies from Dr. Edw. C. Kirk, Dr. Jas. Truman, and Dr. Edwin T. Darby, all of Philadelphia.

The replies received aggregate over 50 per cent. of the letters sent, and have been very gratifying and satisfactory as showing the present-day methods of administration, precautions taken to protect the dental organs, etc.

It will be practically impossible to read all the letters received, but having sent a separate sheet with duplicate questions followed by spaces for the answers, I will endeavor to reduce the entire report to such a form that the prevailing or most frequent replies to each question may readily be found.

EFFECTS OF IRON ADMINISTERED INTERNALLY ON THE TEETH.

(1) What injurious effects, if any, do the various forms of iron, as administered internally, have upon the teeth?

The replies to this question have been very vague. Of the twenty-one replies received from physicians, not a single one has told just *what* the injury to the teeth is. Eleven of them agree that the acid forms injure, or corrode, or affect the teeth, and that all other forms merely discolor, but do no harm. Three state that all liquid forms discolor teeth or have a deleterious effect. Eight claim that they have observed no injurious results.

In summing up, it will be found that the answers to this question are as a rule very indefinite. The great majority, however, agree that the acid forms injure or affect or corrode the teeth, while fully one-third claim to have observed no injurious results.

FORMS OF IRON MOST COMMONLY ADMINISTERED.

(2) Which forms are most commonly administered?

Tincture of chlorid	mentioned	10	times
Blaud's mass pills and capsules	"	7	"
Syrup iodid	"	7	"
Various pills and capsules	"	4	"
Basham's mixture	"	3	"
Reduced iron	"	2	"
Iron carbonate	"	1	time
Sol. iron and ammonium acetate	"	1	"
Elixir iron, quinin, and strychnin	"	1	"
Insoluble forms	"	1	"

The tincture of chlorid, syrup of iodid, and Blaud's mass pill and capsule seem to be prescribed most; tincture of the chlorid more frequently than any other, however.

FORMS OF IRON MOST INJURIOUS TO TEETH.

(3) Which forms are most injurious to the teeth?

Tincture of chlorid	mentioned	16	times
Syrup of iodid	"	6	"
Sol. iron and ammonium acetate	"	5	"
Sol. iron sulfate	"	4	"
All liquid forms	"	4	"

Practically all agree that tincture of chlorid is the most injurious.

PRECAUTIONS IN ADMINISTERING IRON.

(4) When administering solutions of iron, what precautions do you take to avoid injury to the teeth?

Use of glass tube, and rinsing of the mouth with an alkali	mentioned	6	times
Use of glass tube only ...	"	3	"
Thorough dilution only...	"	5	"
Dilution and glass tube ..	"	3	"
Glass tube, rinsing and brushing of the teeth ..	"	3	"

It will be seen from these replies that quite a majority depend upon the glass tube and dilution. When we consider that the glass tube is of no practical value in keeping the fluids from the teeth, these precautions seem to be very inadequate.

MOST SUITABLE FORM FOR ADMINISTRATION.

(5) In your opinion, would it be possible to give the most necessary preparations of iron in pill, tablet, or capsule form?

Twelve answered "Yes;" five answered "Nearly all;" four answered "No."

By far the majority admit that all necessary forms can be administered in pill, tabloid, or capsule form.

PREVENTING IRON MEDICAMENTS FROM COMING IN CONTACT WITH THE TEETH.

(6) Do you know of any other practical way in which these remedies may be kept from coming in contact with the teeth?

Fifteen answered "No;" four answered "Hypodermic injection;" one, Dr. Billings, answered—"All liquid forms can be given in capsules."

Nearly all state that there is no practical way of keeping these remedies from coming in contact with the teeth.

PREVENTING ACIDS FROM COMING IN CONTACT WITH TEETH.

(7) In administering acids internally, what precaution do you observe to keep them from coming in contact with the teeth, and is there no known way of preventing such contact?

Glass tube and rinsing with alkali..	9	answers
Rinsing of mouth and brushing of teeth	3	"
Rinsing only	2	"
Glass tube only	7	"

The replies to this question are nearly all the same as those to question 4. Nearly all depend upon the glass tube and rinsing the mouth.

SOME OPINIONS REGARDING ADMINISTRATION OF IRON.

The replies of Dr. Osler, Oxford, Eng. and Dr. Austin, Paris, I will read, as they are very short, and have an especial bearing on question 5. Dr. Osler says in his letter:

> *Dear Dr. Prentiss,*—I do not think that we have any definite evidence that the administration of iron is hurtful to the teeth. In any case, iron is now administered just as satisfactorily in pill, tabloid, or capsule form.

The extract from Dr. Austin's letter regarding question 5 is as follows:

> I never use liquid preparations; always prescribe in pill, tabloid, or capsule form.

Dr. Frank Billings, Chicago, Ill., writes relating to No. 4:

> Liquid preparations of iron are usually prescribed in capsule to avoid the injurious effects upon the teeth, as well as discoloration. If empty capsules are ordered for the patient, with the iron and a medicine dropper, the patient can fill a capsule—which can be ordered to hold from 10 min. to 30 min.—to be swallowed, and at the same time drink half a glass or more of water.

This is the only reply of the kind I have received in regard to any method of keeping liquid forms from coming in contact with the teeth.

DR. JAS. TRUMAN'S OPINION.

Dr. Truman's letter follows:

> *Dear Doctor,*—Yours of April 20th received. From a medical standpoint, my reply would

not probably be regarded of much value, and yet I may have some ideas on iron as a therapeutic agent that might have a use in the general summing-up of facts.

I cannot understand why your first query, "What injurious effects, if any, do the various forms of iron, administered internally, have upon the teeth?" should have produced "vague answers." If these were from the medical side it may be understood, but how any dentist, long in practice, could hesitate to answer positively is not understandable by myself. I can say positively that all the acid forms of iron do act injuriously upon the teeth, and perhaps others do through chemical change in the stomach. I have, I think in common with most practitioners, suffered by the use of these agents. While all authorities do without exception acknowledge the possible injury to the dental organs, yet the antidotal measures recommended by these authors are, in my experience, rarely adopted, and much more rarely effectively put in practice by patients.

I know of no more aggravating experience, after faithful work on an anemic subject, than to find said subject returning with distinct marks of erosion on all the teeth by the use of acid preparations such as the tinctura ferri chloridi, which seems to be the favorite in use by most physicians. Wood says: "It is very destructive to the teeth and care ought to be exercised in its use about the mouth." In my experience this care is sadly wanting.

You ask, Which forms are most injurious to the teeth? Probably this query would elicit a multiplicity of opinions. My own answer would be, in a general way, that all the preparations of iron in which an acid forms a part are injurious, but not equally so; and even when an acid is absent, the chemical changes in the stomach, as already stated, may produce acid *exudations exceedingly injurious*, but this is not universal. Personally I have never made use of any of the usual forms of iron preparations so much lauded, as ferri chloridum or liquor ferri chloridi, in practice. Where I have found it necessary to use iron, I have made use of the massa ferri carbonatis in the powder form. All the preparations of iron, in whatever form used, have, from my experience, given about the same result. Solliman, in his Pharmacology, confirms this view, for he says: "There is at present no conclusive evidence that different forms of iron have a different fate in the body; the indications are that they behave exactly alike." If this be true, why make use of agents positively destructive to the teeth when brought in contact with these organs?

The precautions to avoid injury to the teeth (4th query) are, without elaboration, alkaline solutions, careful attention to washing the mouth with these, and the use of the brush and tape to carry to all parts. But this care will be only in part antidotal, owing to the difficulty of effectually reaching all parts.

I do not know of any practical way (6th query) to keep the acid iron preparations from reacting on the teeth. I regard all attempts to perfectly accomplish this as futile. Efforts, as already stated, must be directed to prevent acid action. This rarely comes into the hands of the dentist until the injury has been produced. The medical man needs this enlightenment more than does the dentist. While, as already stated, he acknowledges the fact in the medical publications that certain preparations of iron are injurious to tooth-structure, in practice he usually permits immediate general results to override any local injury, no matter how aggravated that may be, or how eventually it may be injurious to the general system he aims to benefit.

I have no occasion, nor ever have had, to administer iron in any of its destructive forms, hence question No. 7 may be left. When I have administered iron, it has been done, as previously stated, when with no special care needed except to advise the constant use of an alkaline wash, to meet possible chemical changes in the stomach.

I do not know, my dear doctor, that my reply to your queries will aid you very much, but I am glad you propose to ventilate this almost forgotten subject. It was once an active one in dental conventions, and should be now. I am not now in active practice, hence I am not entitled to an opinion. My statements allude to the past principally.

Trusting what I have written may be of some use, I remain,

Very truly yours,

James Truman.

DR. E. T. DARBY'S OPINION.

Dr. Darby's letter is as follows:

My dear Dr. Prentiss,—I have never been of the opinion that iron as iron had any injurious effect upon the teeth, but when combined with acids it has the effect of decalcifying the teeth. I think the muriate of iron, which was given largely at one time, is now given but little, because of its effect upon the teeth.

Twenty-five or more years ago I saw in my practice a most appalling instance of the effect of acid solutions of iron upon the teeth of a young lady. She had been coming to me for several years, and then an interval of a year or perhaps two years passed, and I did not see her; when she returned she told me that she had been confined to the house almost the entire time that she had been away from me, and that she had taken great quantities of iron in solution. When I looked in her mouth, I was horrified to find that her teeth were ruined. They were literally decalcified.

Whenever iron is given in acid solutions, it should be given through a tube, and the mouth rinsed immediately with magnesia, lime, or something to counteract the action of the acid.

I should think nearly all of the desirable preparations of iron could be administered in pills or capsules.

Sincerely yours,
Edwin T. Darby.

DANGER OF DILUTE IRON SOLUTIONS.

Dr. Kirk refers to an article by Dr. Geo. W. Weld, entitled "The Destructive Energy of the Tincture of the Chlorid of Iron on the Teeth—An Experimental Study," read before the New York Odontological Society in 1886, (see Cosmos, vol. xxviii, page 627) as a very exhaustive and scientific study of the effects of the tincture of the chlorid of iron upon the enamel. Dr. Weld treated the subject in a very thorough and scientific manner, and leaves no room for doubt as to the deadly effect of the tincture chlorid upon the enamel. One series of experiments which he conducted shows that the full strength tincture chlorid has little effect upon the enamel, but, diluted with water in the proportion of 2 drams tincture chlorid to 1 oz. water, the entire enamel of the tooth is destroyed in twenty-four hours. This is very interesting in view of the fact that a great many physicians seem to think that the greatest safety lies in free dilution with water.

The result of this investigation seems to show that the medical profession does not fully appreciate either the extent or character of the injury to the dental organs caused by the administration of the preparations in question; and while they understand fully that the acid forms are the most injurious to the teeth, yet they still seem to prescribe them much more often than the more harmless ones. At the same time, a very large majority admit that all necessary preparations can be given in pill, tablet, or capsule form.

PRECAUTIONS TO BE OBSERVED IN TAKING IRON.

It is, however, it seems to me, to the matter of *precautions taken to avoid injury* that we should give the most thought. Certainly we all know that the glass tube is of no value in keeping solutions from coming in contact with the teeth. Then, if we are to accept the findings of Dr. Weld, who proves by some very elaborate experiments that dilution of the tincture of chlorid with water renders it very much more deadly in its decalcifying effect upon the enamel, the only precautions taken which are effective are thorough brushing of the teeth and also thorough rinsing of the mouth with an alkali, such as sodium bicarbonate. Brushing the teeth was mentioned in only three of the letters received, and rinsing with an alkali was mentioned in only nine.

It would seem to me that thorough brushing of the teeth as well as thorough rinsing of the mouth with a strong solution of sodium bicarbonate should be performed after each administration of a liquid preparation of iron—or at least of an acid form of iron.

In this connection Dr. Billings' method of prescribing capsules with the remedy and directing the patient to fill the capsules and swallow, followed by half a glass of water, offers a practical way of preventing any of the liquid from coming into contact with the teeth.

My own experience has led me to believe that there is still a great deal of harm done by the present-day methods of giving these remedies, and that a great deal of it could be avoided by more of mutual understanding and co-operation between the members of the medical and dental professions.

THE BREAKING-UP OF A CYST WALL.

By RAGNAR ECKERMANN, Ph.D., Dent.Surg., Malmö, Sweden.

THE etiology of the formation of a cyst is quite uncertain, and various opposing theories have been advanced in regard thereto. The writer is inclined to believe that the formation of a cyst is due to a pathological irritation of the osteoclasts.

The latest statistics regarding cysts, as compiled by the Dental Institute of Breslau, show that they are much more common than is generally supposed. In the years from 1890 to 1911, inclusive, 500 cases were reported, of which 37.8 per cent. occurred in men, 62.2 per cent. in women. Of these cysts, 86.5 per cent. were located in the maxilla and 13.5 per cent. in the mandible. Statistics, however, compiled by other observers, differ from the foregoing.

As to differential diagnosis between a cyst and a malignant tumor, it should be remembered that the former is clearly circumscribed, as can be ascertained by palpation or sounding, and that it contains pus or puriform liquid.

A cyst is to be distinguished from an induration by the crepitating noise resembling that of paper, and by its hollowness as detected upon sounding. Cysts very frequently lie so deeply embedded in the tissues that they are not discovered except by accident, as for instance upon the extraction of a tooth.

The usual method of treatment of dental cysts is that indicated by Professor Partsch of Breslau, consisting in a semicircular incision, lifting aside the gingival tissue, breaking up the cyst wall, tamponing the wound, replacing the gingival tissue, and suturing the same, if necessary. The disadvantages of this method are as follows:

(1) A large wound is produced, involving the risk of infection, and other untoward sequelæ.

(2) A tampon is particularly disagreeable in the mouth, as it impairs normal appetite.

(3) The perforation of the cyst wall with a chisel or osteotome cannot be made without producing uneven and more or less ragged and sharp margins, which prevent rapid healing and favor sequestration.

(4) The flap of gingival tissue is often torn in lifting it aside, thus again retarding the healing process.

Professor Partsch's method may be indicated in hospitals with complete surgical facilities and skilled general surgeons; for the dental surgeon, however, the following mode of operation offers great advantages:

After diagnosing a cyst, its margins are determined partly by sounding, partly by the X ray, and the gingival tissue is anesthetized. With a sterilized large cone-shaped bur in the dental engine, first the gingival tissue, then the hard cyst wall, are perforated. This may seem a rather crude procedure, yet within a few seconds the bur will have perforated the wall of the cyst, leaving in the gingival tissue overlying it a perfectly smooth, round aperture with even margins which will be slow in healing up, as is desirable in this case.

After the bur has once perforated the cyst wall, the wall portion underlying the gingival tissue is easily reamed away with the bur from the inside, care being taken not to injure unduly the gingival tissue, which, unless it be underlaid with hard structure, is not easily penetrated by the bur. After the entire front wall of the cyst with its smooth margins as produced by the bur, has been removed, the interior of the cyst is flushed with perhydrol followed with warm water, and the liquid contents of the cyst and the rest of the bony wall can readily be removed through the aperture in the gingiva. In this way, the whole operation requires only a few minutes.

The after-treatment consists in flushing the cavity with water as warm as can be tolerated, and, if desirable, with perhydrol once a day at first, then at longer intervals. The patient is instructed to apply to the wound several times daily a dressing of cotton saturated with zinc sulfate and alum āā 1 in 300 parts of water, leaving this dressing in place for ten minutes.

The advantages of this method of operation are as follows:

First: The operation is relatively unbloody, and involves a clean surgical technique.

Second: The gingival tissue is preserved almost in its full integrity.

Third: No sequestra ensue.

Fourth: There is no need of tamponing, so disagreeable in the mouth and so destructive to the normal appetite.

Five: There is no need of corrosive antiseptics.

Sixth: The healing process is rendered rapid.

Seventh: The aperture in the gingiva is so small that food débris cannot enter, yet is large enough to permit of effective flushing with a syringe.

Eighth: The physical and psychic effect of this operation on the patient is no worse than an ordinary tooth extraction.

If a cyst should prove to be very large, two entries can be effected, although this is not necessary. In certain cases where the cyst is situated very deeply, longer burs of the same type as described should be employed.

ANSWER TO DR. DEWEY'S DISCUSSION.

By CALVIN S. CASE, M.D., D.D.S., Chicago, Ill.

INASMUCH as there seem to be some important additions in Dr. Dewey's discussion (at page 341) of my paper published in the March Cosmos—entitled "The Question of Extraction in Orthodontia"—that did not obtain or that escaped me in its delivery at the National meeting, and also because I was obliged to abridge my closing on account of the lateness of the hour, I have decided to more fully reply. I feel also that I owe it to myself to correct a number of his misstatements and false inferences in regard to the claims of my paper, although I shall mention only a few as a fair sample of the many. I wish, moreover, to analyze some of his false interpretations of the well-established principles of biology which may mislead those who are not in full touch with that science.

I can understand how a man may be led into earnestly believing false theories and into building upon this basis a framework of false deductions and propositions which are made to sound more or less reasonable in an argumentative sense, but I cannot see why any man of Dr. Dewey's supposed ability can allow his prejudices to lead him into an attempt to stultify self-evident truths and well-established and easily verified evidences of scientific investigation, by a series of false inferences and statements that are only worthy of a wily lawyer. Nor can I understand how any honest man can openly proclaim, as biological truth, new theories in regard to the workings of nature's secret laboratories which are not even sustained by the most liberal rule of scientific evidence, solely for the purpose of giving a scientific coloring to some of the radical features of a teaching he has espoused and aided in foisting.

When Dr. Dewey was repeatedly called

upon by Dr. Hinman to tell what he would do with the cases of bimaxillary protrusions which I exhibited, he finally replied—"As I said before, certain features of this paper have appeared to me as a joke. Bimaxillary protrusions are a joke." In other words, such conditions in his estimation do not exist in practice, and yet on that occasion, as shown by the published illustrations, I exhibited the lantern slides of fifteen cases of pronounced bimaxillary protrusion which presented in my practice during adolescence and adult life, in all of which could be seen the nearly normal disto-mesial relations of the buccal teeth, accompanied by the most unhappv of all the dento-facial deformities. 'And yet Dr. Dewey tells us this is not "good proof" that such conditions arise in practice with the white race.

The reader will perhaps remember what the old farmer said when he was first brought face to face with a camel: "Thar *ain't* no such darned animal." In other words, to the farmer it was a "joke," an artificial production of some kind set up to befool and amuse the public.

I exhibited the pictures also of Dr. Cryer's remarkable case of bimaxillary protrusion, and mentioned three other less pronounced cases in my practice among young patients, which I was holding for a more advanced development to tell me whether I should or should not extract.

The reason I illustrated so many cases from my own practice of this character of malocclusion was to prevent being told —as probably would have occurred had I presented only one or two cases—that it was a "freak" condition of very rare occurrence, whose treatment properly belongs to surgery rather than orthodontia. These and other characters of extensive protrusions are "freaks" and "jokes" and all that among the Angle men because they realize that such cases cannot be corrected, according to the highest ideals of dento-facial art, without extraction, which to openly acknowledge would destroy the basic principle of their teaching.

The futility of this frantic effort is beginning already to be shown by the demands of the people as they learn the true possibilities of orthodontia. This has been proved in several instances in my own practice, where I have first corrected with a normal occlusion, with the hope that the developing forces would harmonize the facial imperfection. And I believe that the popular demand will do more, as in other branches of dentistry, to correct these evils than anything else. Parents will not be satisfied to have their children left with those protruding mouths and receding chins and abnormally widened dental arches that are frequently seen as finished cases right from the hands of the men who claim to be performing "modern orthodontia."

Fortunately for the people, nearly all the most advanced and experienced orthodontists, of whatever school, whether openly acknowledging the fact or not, are today extracting teeth in the correction of those same marked protrusions that I extract teeth for, because a very little experience mixed with commonsense soon teaches them the inadequacy of the autocratic rule of—"No extraction in any case;" especially when the results pertain to the marring or building of their own reputations in the communities where they have chosen to practice. You cannot forever choke off the truth, no matter how adroitly and apparently truthful you make the wrong way appear. But I also say, Thank God for Dr. Angle and the choking!—for it was his hand which unloosened the pendulum from the disgraceful grasp of extracting malpractice, and sent it on the right way; and though the impetus of that movement carried it for a time far out of true equilibrium, who can say that the extra swing has not done more good than would have been possible with any half-way measures tinctured with a more truthful and less comprehensible codicil.

When Dr. Dewey was further pressed by Dr. Hinman to say whether he would or would not extract if he should *happen* to have a case of excessive bimaxillary protrusion similar to those shown, in his published discussion he replies as follows:

> No, I would not. In the cases which the essayist has exhibited as representing bimaxillary protrusion, he has unfortunately shown only the profile and not the front view. But he has made the statement that the buccal teeth were in normal occlusion. They were not, however, in normal occlusion in the model that was passed around.

That certainly was an amusing slip, as there was no model of a bimaxillary protrusion of the teeth passed around! The only model that was passed was that of a *corrected* case of bimaxillary protrusion, showing a perfect masticating interdigitation of buccal and lingual cusps, which apparently was so perfect, though not a normal occlusion, that Dr. Dewey, it seems, did not discover that four bicuspids were missing. It is not to be wondered at, however, and is an illustration of what frequently occurs after bicuspids have been extracted and the front teeth properly retruded, etc. Even dentists will not at once discover that teeth are missing, unless their attention be called to the fact.

Notice the following blare of trumpets, and how it appears under a truthful examination:

> A great amount of time was consumed in discussing the question of inheritance, particularly in trying to prove that malocclusions which were the result of inheritance could not be treated without extraction. No biological facts were stated which would prove to me that malocclusions could be inherited or produced by mixing of types. I now want to call to your minds how inconsistent the essayist is in his paper. He tries to prove that cases are the result of inheritance or inherent tendencies, and that such cases cannot be successfully treated without extraction. In another portion of the paper, however, he describes a case which he claims to be the direct result of inheritance, and which he would treat without extraction. I would therefore like to inquire why, if it is possible to treat one case, claimed to be the result of inheritance, without extraction, it is not possible to so treat the others? I am greatly confused on that point.

In no place in my paper did I make the slightest attempt to prove that inherited malocclusions, as a class, could not be corrected without extraction. As a matter of fact I have for many years taught that nearly all malocclusions which I claim have arisen from inheritance *should* be corrected without extraction. It is only in those cases of excessive protrusion that extraction is demanded. In those of a lesser degree, with children and in early youth, extraction should never be resorted to until one is certain that the developing growth of other parts will not correct the dento-facial protrusion that is left after treatment without extraction. The case he refers to is Fig. 14, page 151 of the February COSMOS. It represents one of three cases of bimaxillary protrusion in my practice which I said I was holding in abeyance, after placing the teeth in normal occlusion, for the developing forces to tell me if I must extract four bicuspids or not.

DISTAL MOVEMENTS.

In another place Dr. Dewey says:

> In the treatment of cases of classes II and III, Dr. Case admits that teeth can be moved distally. *A few years ago he would not admit that.* Possibly in a few more years he will admit that malocclusions are not inherited.

Nothing could be farther from the truth. From the first detailed possibilities of intermaxillary force, which I published over twenty years ago, up to the present time, I have always claimed that a distal movement of the teeth was one of its principal functions. In my writings of many years ago, I said: "While it may be possible in a frantic effort to move the first molars distally, for children *the full width of a cusp,* such an extensive movement should never be undertaken, except in those instances where the premature loss of deciduous teeth had permitted the molars to extensively drift forward." In a paper entitled "Rise and Development of Intermaxillary Force in Orthodontia," published in the May COSMOS of 1907, I referred to a consultation with Dr. Geo. W. Haskins, a prominent Chicago dentist, which took place in the spring of 1891, in which I advised the distal movement of the lower left bicuspids and cuspid with the *intermaxillary elastics* attached to the distal portion of a stationary anchorage on the upper left molars; I further told in that same article how Dr. Matteson commenced the *disto-mesial movement* of the upper and lower teeth with the intermaxillary force for the correction of occlusion in 1894, following my papers read before the Chicago Dental Society in the winter of 1892–93, and before the World's Columbian Congress in the following August; and how a number of these patients of Dr. Matteson's fell into the hands of Dr. Angle at the clinic of the Northwestern Dental School, who ordered the intermaxillary appliances removed for the application of his own methods, but which did not prevent him five years later from publishing this same principle of movement as his own invention, though giving credit for the character of force to Dr. Baker, who—as I showed evidence to prove—employed the intermaxillary elastics for the first time practically in 1896, and then as *an auxiliary to aid in forcing the mandible forward* in an operation of jumping the bite.

This is history which cannot be gainsaid by all kinds of falsifying. I would not mention it at this time were it not that Dr. Dewey, in his discussion of Dr. Noyes' paper at the National meeting, reiterated that silly attempt to divert the truth in regard to the origin of the distomesial intermaxillary force.

HEREDITY IN SYPHILIS AND TUBERCULOSIS.

In the course of Dr. Dewey's discussion for the purpose of proving by analogy that the belief in heredity of malocclusions was a passing or past theory, he indulged in the misleading premise that it was now known that syphilis and tuberculosis were not transmitted *in any form;* namely—

> Does not the Bible state that the sins of the parents will be visited upon the children? Many have thought that syphilis was one of the sins referred to, but now, it having been proved that syphilis is not inherited at all, contrary to the opinions still held by some, but that it is the direct result of an organism, therefore we find another pet theory exploded. But a short time ago tuberculosis was thought to be inherited; now it is proved that it is never inherited.

Nor was it so very long ago also that the whole world believed that the earth was flat, etc., but I would like to ask what that has to do with the present subject? Besides, the statement, like many others from Dr. Dewey, is not true in its relation to heredity, which after all is the real question of contention.

No competent mind has claimed for many years that the pathogenic microorganism of syphilis and tuberculosis, *per se,* are transmissible. In fact, those who are at all versed in the principles of biology know that the existence of all living organisms, whether visible to the naked eye or not, are under the same common laws of individual propagation and development.

What is really to the point, the world has been filled for many generations with the victims of these diseases purely through direct or atavistic heredity, expressed in a variety of morbific forms or cachexia, whose predisposing influences have caused sufferers to become easy prey to the ravages of these diseases, with fatal results, and who otherwise would have been immune, or readily amenable to treatment. Moreover, it is a common clinical experience to find these inherited morbid taints, with no actual infection from without, of the severest nature, causing whole lives to become burdens, with no possible hope of cure.

Dr. John B. Murphy, whose name is well known throughout the entire medical and surgical world, writes me as follows in discussing this phase of the subject:

> There is no question but that we inherit positive tendencies to certain diseases and positive immunities and minor or lesser immunities to others. True, these diseases may be and in the preponderance of cases they are of specific microbic origin, but it is a very well known and accepted clinical fact of everyday demonstration that the same microorganisms, derived from the same source and transmitted to three individuals under identical circumstances, will in one progress to a fatal termination; in the second it will

produce a mild illness; and in the third it will have no effect at all, or, in other words, the latter individual is immune. Even immunity is inherited as well as acquired. There is not the slightest doubt that many patients inherit a decided predisposition to the infection of tuberculosis, and offer little or no resistance to the destructive effect of the acquired infection, and that it rapidly progresses to a fatal termination; while in others the infection, when once instituted, is rapidly overcome by the individual's resisting and reparative power.

While it may never be known how the spermatozoa of syphilis carry the activities of metabolism to the germs, it is definitely settled that the fetus in utero may have syphilis, even when the mother does not show and never has shown any signs of the disease. There is no doubt that immunity and predisposition to disease is a clean-cut and inheritance condition, just the same as physical characteristics and conformations are. There is also no doubt that environment, occupation, sanitation, and habits influence these tendencies to a great degree, as they influence character, physical characteristics, and temperament.

Until the principles of eugenics are applied to the human race for several generations, we cannot hope to materially influence the physical conformation and predisposition of inheritance.

One of the encouraging signs of the times is the broad and comprehensive views of the whole subject from a biological standpoint expressed in your paper and its discussion, published in the COSMOS, which I have read with much pleasure. I consider it a striking example of advanced lines in the art and science of dentistry.

HEREDITY IN MALOCCLUSIONS.

Dr. Dewey and other teachers of the "new school" seem to base their entire argument against the possibilities of inherited malocclusions upon that "old saw"—as Angle calls it—of "small jaws of one parent and the large teeth of the other," or "the mandible of one parent and the maxilla of the other." Whereas that particular feature of direct inheritance has for many years never been claimed by either Dr. Cryer or myself as occurring except in *very rare* instances, and therefore is one of the very minor characters of inherited malocclusions.

Dr. Dewey's claims are as follows:

> From an embryological point, it is *impossible* for a child to inherit the mandible of one parent and the jaws of the other. . . . The mandible and maxilla are both derived from the same source (the same embryonic bud). The premaxillaries are derived from the fronto-nasal bud, but they make up a small part of the upper arch as compared to the maxilla proper. How, then, can the child inherit the mandible of one parent and the maxilla of the other?

I will answer this by again quoting from a letter received from Caroline E. Stackpole, teacher of biology in Columbia University, and author of a recent handbook entitled "Biology," the introduction of which is written by Frederick Starr, professor of anthropology in the Chicago University, and which comes fully indorsed by the leading colleges as the most modern teaching of biology. She writes:

> A statement like—"Nature never puts teeth into a mouth that do not belong to that physiognomy," always arouses my ire. Variation is so thoroughly the rule in nature, not only in individuals, but in *parts* of individuals, that there is *just as apt to be disharmony as harmony.* I suppose your opponents would hold that bone and teeth, coming from the same elementary tissues, would carry the same inheritance, *but observations show this to be untrue.* And obviously it is untrue in relation to the bones of the head.

Let us hope that some of the men who have endeavored to combat the establishment of this principle of inheritance by ridicule and unfounded assertions will sometime awaken to the realization that in these efforts to discredit a teaching which shatters one of their so-called "basic principles," they are not only falsifying the teachings of the most advanced biologists, but are casting discredit upon the education and advancement of the dental profession.

My reasons for going into the subject of biology and ethnology along the lines of evolution in the admixture of inharmonious racial types, was to show by the laws of natural selection and variation how disharmonies may arise in the relative sizes, and particularly the antero-posterior relations of the jaws to each other and to the other bones of the cranium; also the untypical sizes of teeth to jaws and to the features of physiognomies which are observed everywhere.

Nor was it claimed that these inharmonious malrelations arise to the extent that we see them directly from parents both of whom may or may not individually possess normal dental and facial relations, though quite unlike each other in regard to size and shape of features, however possible such an event might be, but it was principally to call attention to the well-established biological truth, known as "Mendel's law," that the direct offspring from dissimilar types of selected plants of the same species rarely if ever exhibit *associate* parts one of which resembles the male parent and the other the female; but in the next or succeeding generations, with proper selection and union of these same offspring, such departures, which may constitute quite irregular types, are not uncommon, and can be made to ultimately form fixed or constant types by repeated reproductions. This no doubt holds good to a greater or less extent with animal types.

While the direct offspring from two dissimilar racial types, or two quite dissimilar types of the same race, may be a harmonious blending of the parents, or result in types that resemble one or the other parent, in the second or third generation may be found offspring who possess certain physical characters or characteristics which closely resemble those of one grand or great-grandparent, in conjunction with other characters that are distinctively peculiar and traceable to another forbear, however inappropriately dissimilar or esthetically inharmonious they may be, and even though as closely associated as are the organs which form physiognomies. If this were not possible there would be no "Mendel's law" of biological development. Thus we see noses, ears, maxillæ, mandibles, and teeth which are quite out of harmony with the balance of the features, purely through atavistic heredity. If the jaws are protruded or retruded in relation to other parts, the contained teeth are protruded or retruded, because in all cases of protrusions and retrusions of the jaws, the roots of the teeth and nearly always the crowns are carried with the jaws.

The whole tenor of Dr. Dewey's discussion, along the lines of the Angle teaching, is to show that all malocclusions and facially deforming conditions which are due to malpositions of the teeth and jaws have arisen from causes that have operated after birth. In other words, all variations from the normal, typical, and esthetically perfect—according to race—have arisen in the individual from local causes or from the influences of environment.

My paper freely admits that a very large proportion of these conditions arise in that way, but it maintains that it refers only to those diseases which inhibit or retard the normal growth development of the jaws and teeth, or indirectly cause the muscles to bend the jaws out of shape —excepting, of course, accidents, disease hypertrophies, and artificial forces, etc., which may obtain.

I endeavored to show that ethnology teaches that reproductions from the union of dissimilar types do not necessarily result in blended composite types, even in parts which are so closely related that some of them spring from the same bud of embryological development. This is true, also, throughout the entire biological development of plants and animals.

In connection with the law of heredity, the "law of natural variation" has played no inconsiderable part in the characterization of individuals with forms, qualities, and colors that had no previous existence in ancestors. Being laid down in the germ cells, variations of this source become inheritable variations, which together with inherited characters continue as constant types, or ultimately die in proportion as they are unfitted to exist in the environment which nature provides. This is known in biology as "natural selection." The results of cross-breeding under special environments induced and provided by man is known as "artificial selection," which, as explained in my paper, is under the same general biological laws as natural selection.

Variations which are induced to arise from environment or are forced artificially *are not transmissible,* except in those rare instances where the causes continue to operate through many generations, to finally become inherent or natural variations and constant types.

While it is true that individuals can be made to grow more vigorous and strong through the influence of foods and cultivation, even to marked variations in the flowers and fruits of plants, and by intelligent exercise the muscles of the body may be excessively developed, it is a fair belief that it is but the stimulation and forcing of dormant properties that are inherent.

Biology further teaches that all physical variations in the anatomical framework or structure of individuals from natural causes never arise from environment, but are due solely to the laws of heredity—direct or atavistic—or to "natural variation," which means that they are invariably laid down in the metabolism of the germ cells of each individual. This has been found especially true in the ethnological development of different types of the human race.

Variations, from whatever source, that are sustained through the law of *natural* selection have nothing whatever to do with the typical, the beautiful, or the esthetic in form, except in so far as they are more attractive to mates or better fitted for the co-ordinating forces of propagation. Nor are retrograde variations from the harmonious or beautiful, even though repulsive in appearance, less liable to be sustained except in so far as their physical imperfections render them unattractive to mates, or incapable of performing the functions of life sufficiently for perfect sustenance and health.

The reason I speak of this is that so much has been written of late in regard to the wonderful necessities of an absolutely normal—which means typical—occlusion of the teeth "without the loss of a single tooth or its artificial substitute"; whereas it is rare to find typical occlusions even among perfectly healthy and vigorous people, and common to find occlusions decidedly abnormal, and yet whose dentures are fully capable of performing all the necessary demands of mastication; to say nothing of those decided protruding unimaxillary and bimaxillary malocclusions, which before and after correction by extraction are far from a normal occlusion, and yet with sufficient interdigitation and closure of buccal cusps to perfectly perform mastication.

In the following quotation from Dr. Dewey he both admits and denies, by a juggle of words, that natural variations, including malocclusions, are transmitted or inherited.

> It is a well-established fact that only those characteristics which are impressed upon the germ cell can be inherited. Nature cares little for the individual, but looks after the species. Variations are constantly arising, and those which arise suddenly are transmitted, providing they are beneficial to the species. If they are not, those of the species which possess them will be lost in the race of life. Malocclusions which are acquired do not arise suddenly, and are not transmitted, because there has never been a logical explanation given of how they could be impressed on the germ cell, thus eliminating a large number of conditions.

Why does he say that only those variations which arise "suddenly" and are "beneficial" are transmitted, when he has just told us that "nature cares little for the individual," and then follows it by admitting that variations which are not beneficial *are transmitted,* but lost in the race of life. I hardly think he will deny one of the principles of biology—that natural variations which do *not* "arise suddenly," but are slight variations, even to imperceptible gradations, are transmitted. Malocclusions which arise from local causes are certainly not transmitted for the reason he names, but what about the natural variations, which he admits are transmissible or inheritable characters, and which biology teaches are quite as liable to be inharmonious to the individual?

"BONE-GROWING."

To the casual reader, the most seemingly plausible of the many errors in

Dr. Dewey's scientific deductions, but which any biologist will say is based upon entirely false premises, occurs when he attempts to prove Dr. Fred Noyes' fantastic theory of "bone-growing."

In beginning this phase of his argument, he gratuitously introduces his usual misstatements relative to the claims of the essayist. His idea of discussion seems to be to first set up these straw men of his own origination, which he then proceeds to attack with Don Quixote-like bravery and zeal, with apparent blindness to the dangers of the great arms of the mill of truth that may follow.

He begins as follows:

> As to the question of bone growth, upon which the essayist has written so many pages, he sees fit to doubt the statement that bone develops as the result of mechanical stimulation. He says that there are no conclusive biological proofs therefor, while in reality all of the biological facts go to prove it. If bone does not develop as the result of mechanical stimulation, how does it develop?

The following from my paper shows how truthful this is:

> It is freely admitted and frequently verified that bones whose natural development has been inhibited by disease may be stimulated to a revivification of normal growth; also that the physiologic development of true bones may be quickened by artificial stimuli to a more rapid growth toward the normal adult sizes, but I doubt if it will ever be possible to cause the true bones of an individual to grow larger or longer than the sizes which are stamped upon them by the laws of heredity.

He continues in the same paragraph as follows:

> In the study of the development of animals, from the single-cell animal with no skeleton or osseous structure, to the multicellular animal with complicated structure, we find evidence of mechanical stimulation throughout; also in the development of the multicusped tooth from the single-cusped tooth, mechanical stimulation resulting from use has been at work throughout. The development of the bone supporting the teeth has been brought about as a result of mechanical stimulation through the use of the tooth. If force which is the result of natural conditions causes the development of bone, it is logical to expect that artificial force properly applied will produce the same effect. We have found this to be the case. Every day arches are being developed as the result of mechanical force, mandibles are being induced to grow, and results are being accomplished that would be impossible without the growth of bone.

From this I feel sure it would be presumed by a lay reader seeking information that the sizes and numbers of cusps of teeth, and sizes of mandibles, etc., have been and can be induced to grow in the individual—beyond their natural or inherited states—by the application of mechanical force; and furthermore, in the developmental processes of past ages, mechanical stimulation from without and —if you please—from within, which, as Dr. Noyes claims, "in no wise differs from the mechanical forces of regulating appliances,"* has produced marked changes in the structures and sizes of parts of individuals during their developing lives, that have been transmitted to offspring, and that this is the principal if not the only force of evolution productive of variations that have resulted in the variety of plant and animal life. And yet in another place he contradicts this interpretation of biological development by admitting the true teachings of biology, *i.e.* that no variations which are induced to arise in the individual in this way or by local causes are transmissible —"Because"—as he says—"there has never been a logical explanation given of how they could be impressed upon the germ cells."

Let us presume by way of argument that I have given a wrong interpretation of his understanding of organic evolution, as it is quite difficult to tell what he does mean by his many contradictions of himself. Let us by a decided stretch of his words say that he means that the mechanical forces of use and the demands of environment *have stimulated in the germ cells* metabolic activities toward co-ordinating variations which have finally resulted in the various forms of life. This is one of the theories of biology which had strong advocates many years ago. And yet, even by that, I still fail to see how this has any bearing whatever in proving that the true bones of an animal can be induced through artificial forces from without to take on extra interstitial growth that will result in making them larger or longer than their inherent sizes.

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* Noyes, *Dental Review,* October 1910, p. 987.

The science of organic evolution which is now accepted by all competent biologists asserts that variations in plant and animal types, through all the past and present forms of life, have not originated because of the stimulation of use or influences of environment, but they have arisen solely because, first, of the *law* of "natural variation," and second, the law of heredity through the mixture of dissimilar types. *The influences of use and environment are subsequent forces upon already endowed forms and qualities,* destroying the less adaptive variations, while they stimulate to a more vigorous growth and reproductive strength the fitter types of life.

The neck of the giraffe, and the necks of its millions of progenitors back to the first variation which marks this offshoot, did not grow to its present length by increasing the inherited lengths of its seven cervical vertebræ during the lives of individuals, even though stimulated by the demands of hunger and repeated efforts to reach higher for food. Nor did one little particle of an extra cusp of a tooth ever start to develop because of use or otherwise which was not first laid down in the germ cells of progenitors through the laws of "inheritance" or "natural variation." What these unseen guiding forces are—or any of the subjective qualities of all natural forces—we probably will never know in this life, beyond the objective phenomena or results.

The men who have been devoting their lives to these results, in the biological field, in patient painstaking investigation, tell us that this is the only way in which structural variations from the parent stock are brought about. This is not to underrate the important part which environment plays in the great work of evolution. Nature selects only those whose endowments permit them to live, and those who possess the more adaptive qualities are to that extent more capable of a co-ordinating development and of propagation. They are, moreover, better fitted through their vigor to aid in the transmission of those adaptive natural variations which they may have been the very first to possess.

It would seem that Dr. Dewey, who appears to be so well versed in the physiologic principles of embryology, must know these truths, and that they are simply incompatible with the fantastic features of this new "bone-growing" theory; also the theory that all malocclusions of the teeth are always in harmony in size and shape with the jaws and features; or that nature always starts out to build a perfect denture in each individual, and would do so if not interfered with by some local cause.* If he is not so versed I would advise that he cease these aimless wanderings in the mazes of science to prove unverified theories with arguments which seem to rely so wholly upon false interpretations and misquotations.

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* Angle, DENTAL COSMOS, March 1910, vol. lii, p. 261.

PROCEEDINGS OF SOCIETIES.

DENTAL FACULTIES ASSOCIATION OF AMERICAN UNIVERSITIES.

Fourth Annual Meeting, held at Ann Arbor, Mich., January 22, 1912.

First Session.

THE fourth annual meeting of the Dental Faculties Association of American Universities was called to order on Monday, January 22, 1912, at 10.30 A.M., by Dr. Eugene H. Smith, vice-president, the president, Dr. J. G. Sharp, not being present.

The secretary, Dr. Edward C. Kirk, called the roll, and the following representatives responded: Dr. Alfred Owre, University of Minnesota, College of Dentistry; Dr. W. S. Hosford, University of Iowa, College of Dentistry; Dr. Eugene H. Smith, Harvard University, Dental School; Dr. N. S. Hoff, University of Michigan, College of Dental Surgery; Dr. Fred E. Hart, University of California, College of Dentistry; Dr. Edward C. Kirk, University of Pennsylvania, School of Dentistry. Others present at the meeting were Drs. Edwin T. Darby, Henry Morrow, F. H. Orton, L. P. Hall, E. T. Loeffler, M. L. Ward, R. W. Bunting, and C. J. Lyons.

The next order of business was the reading of the minutes of the previous meeting. Motion was made and carried that, inasmuch as the minutes of the previous meeting had been printed and distributed among the members, the reading of the minutes be dispensed with.

Dr. KIRK called attention to the fact that with the minutes of the previous meeting had been printed the minutes of all previous meetings of the association.

The vice-president, Dr. SMITH, read a communication from the president, Dr. Sharp, as follows:

SAN FRANCISCO, CAL., January 5, 1912.

My dear Dr. Smith,—As it is quite impossible for me to leave my office in January and February, I will not be in attendance at our meeting in Ann Arbor on the 22d, but wish to send you my good wishes for a successful meeting. I shall write you my views on various matters in a lengthy letter to follow immediately, and shall further discuss matters with Dr. Fred Hart, our new instructor in technics, who will represent our university pedagogic meeting.

I wish to apologize to all our members for my apparent apathy in the affairs of our association during the last year, but I have not felt up to standard since our delightful meeting in Iowa, so have had to throw off several responsibilities and take a number of holidays not on the calendar, and as I am too young to be old, I am taking time by the forelock.

Most sincerely,
JAS. G. SHARP.

The annual address of the president, Dr. J. G. SHARP, San Francisco, was presented to the association, and was read by the secretary, Dr. Kirk, as follows:

PRESIDENT'S ADDRESS.

Members of the Dental Faculties Association of American Universities,—I most sincerely regret that circumstances make it impossible for me to meet personally with you on this, the occasion of our fourth annual meeting. However, Dr. Fred E. Hart has been appointed by the president to represent the University of California, and he carries with him the good-will and greetings from the members of our faculty to their co-workers in our association. It is with a longing interest that we look forward to his return to California, and to a report of great strides of progress contemplated for the coming year, together with one of a clean bill of health for the year that has just closed.

I must remind you that as our labors in the matter of education have placed us in the rôle of public servants, it is incumbent upon us to proceed cautiously, and always with a thorough understanding that we must do our full duty and render a complete and honorable report to the profession and the people in whose interest the work of this association is being carried forward. Not only should we strive to submit a creditable report of our own actions, but it should be the object of our association to invoke the aid of all other possible factors to promote the same cause, to discourage stagnation, and to condemn retrogression.

DENTAL EDUCATION.

It is quite apparent from only a casual glance at the literature on the subject of dental education that has appeared during the past year that the entire dental profession is not in accord with the principles of high standards for our profession, and in this respect this association may even be said to have some bitter enemies. These little obstacles to an upward path, however, are easily brushed aside by a clear conscience and the evidence of respect and confidence from many other quarters, which latter should give us cheer and make us feel that high standards are not altogether a forlorn hope. In making this statement I wish again to remind you all that it will be well for us to keep in mind the fact that there is one centralized educational body in our government to which we may look for guidance in carrying on our work, and through which our afore-mentioned report to the profession and the people should be rendered.

DENTAL COLLEGES.

From the interesting reading we have had in the last year or two on the subject of dental education, one good and wholesome conclusion that we may reach is, that this topic is wide open, and if our association accomplishes nothing more for the next five years, it should keep it so, if possible. Let us refrain from going into executive session or forming committees of the whole, to discuss problems that might offend the delicate senses of some, and let us enlighten the minds of those who are eager for knowledge on this subject. Let us refrain from being swayed in our deliberations because we fear the criticism of our enemies, and, if perchance this association is at present or ever should become the highest dental organization in this country, let us individually and collectively accept its glory in dignified quietude, as the just deserts of an honest effort, without a pat on our own back and a shake of the left with the right. In a recent article, published in the *Items of Interest,* entitled "Dental Educational Prognathism," the author mentions as one of the factors responsible for low professional standards the dental college body. My impression is that this statement is perfectly correct, and a truth that is generally accepted by most educators, but not so generally admitted. Framed in different language and based upon my interpretation of it, we have practically the same charge brought against the dental schools of our country in the report of the Dental Educational Council of America, composed chiefly of men thoroughly conversant with educational affairs in this country. We are reminded very much, as a matter of fact, in this whole matter of dental colleges, of a diseased patient who knows his symptoms and diseases, but hesitates to tell them to the doctor or even consult one for fear of having his suspicions verified, or because of the drastic treatment that might be applied. So let us all unite, go to the doctor, and be cured! Even if he lops off a finger or two that cannot be cured of its canker, I believe the cleansed body educational will be more fit to carry on its work and command far more respect than has generally been accorded it. I have in mind two good doctors, if we can only make up our minds to visit them—the Carnegie Foundation and the department of Education at Washington.

ORGANIZATION OF AN EDUCATIONAL COUNCIL.

As to the organization of an educational council, I am thoroughly in accord with the principle and ideals which call for its establishment. To secure, however, the greatest amount of good from such a body, or to give it any standing at all as a national body, it should work in co-operation with the bureau of Education at Washington, and possibly should be appointed by that department, and not by any self-constituted organization within the profession. Since the United States government has taken the initial step in this very matter of professional education, by the appointment of a special commissioner, I believe it would not be presumptuous on our part to request this commissioner to call such a conference, or tender him our services in establishing one, that he might participate in our professional educational affairs. From him, the Council would receive material aid in exchange for what assistance it might render him, but such a council should be thoroughly representative of all the dental educational bodies in the country. I recommend action of this nature by this body.

STANDARDIZATION OF DENTAL SCHOOLS.

Our organization has already recommended that the Carnegie Foundation establish a preliminary standard and guarantee of such standard for the schools of this association. Since that action was taken, however, the Dental Educational Council of America has rendered its report to the National Association of Dental Faculties, in which it sets forth, through its president, I believe, the value of the Carnegie unit system and the standardizing of many educational institutions. With this additional stimulus for uniformly high and secured standards, this association should extend the scope of its previous action, and request the Foundation to consider the question of standardizing all dental schools, regardless of the organization with which they may be affiliated. By such an alliance, as it were, with the bureau of Education and the Carnegie Foundation, the question of the demise of weak dental schools would not enter into the establishment of proper standards, but such schools would be given the opportunity of improving, until they would soon become standardized and accepted into the fold on an equal educational footing with accepted schools. By such a method of standardization of our schools, there will be no need of such college organizations as this, except merely as a conference body, such as the Institute of Dental Pedagogics, and a positive minimum standard would be established, sanctioned by the highest disinterested educational bodies in our country.

TOKYO DENTAL COLLEGE.

Having just received a letter from the Tokyo Dental College, I refer it to this body, that its contents may be considered. As set forth in this letter, the standard of the school in question is equivalent to that of our own schools, and apparently is approved or controlled by the Japanese imperial government. I should recommend that we refer this matter for verification to the Educational department at Washington, and, if it is approved, that the graduates of the Tokyo Dental School be given proper credit. I wish to state in this connection that at present a graduate of that college is in attendance in our school as a special student, and is doing most excellent work. The Japanese with us have generally made good students.

SUBSTITUTION OF PHYSICS FOR CHEMISTRY.

Another question for consideration by this body is the preliminary requirements as applied to the University of Iowa, which requests that physics be accepted as a substitute for chemistry. If, by such a substitution, the standards of our organization are not in any wise lowered, I cannot see why such a change cannot be allowed, provided the course in physics be fully the equivalent of the present requirements in chemistry. In connection with this matter, I wish to add that with us in California the condition is very similar, it oftentimes being necessary for applicants holding a high-school diploma from our schools to make up this subject, or to carry it as a condition.

ENTRANCE EXAMINATIONS.

I believe students entering our schools should do so through precisely the same channels as those by which they enter any other college or university. I speak of this matter and make such recommendation because, regardless of how fairly examinations are conducted by a specially appointed examiner, such a college is still exposed to much criticism, which reflects in turn upon any organization of which such a college is a member. This question should be fully discussed and recommendations made at this meeting.

TRANSFER OF STUDENTS.

In the transferring of students from one college to another listed in our association, I see another topic for consideration, for in my opinion such a transferrence is generally occasioned by a student's failure to have attained a satisfactory grade in the college from which he is transferred, although having reached a passing mark. In such cases, I am sure the best interests of the student and all concerned are accomplished by compelling him to continue his work in a place where his faults are best known. Pursuing such a belief, I should recommend that, in being transferred, a student should be specially recommended, unless in the opinion of the school which he is leaving the transferrence is necessitated by some other very important and unavoidable cause. That a school should admit to advanced standing students who barely wriggled through a lower class in another school is unjust to the students, the college profession, and the public.

NATIONAL HYGIENE ASSOCIATION.

Since the members of this association are essentially concerned in building up the profession of dentistry by properly equipping men to enter it, we should take full cognizance of the excellent work that is being done in the educational line through other sources. I refer particularly to that of the National Hygiene Association. While we as an association may not be in a position to offer any material assistance along this line, yet we should use our individual efforts in carrying it to a successful issue. To me this task, more than almost anything else, commends our own work to the greatest possible consideration, for it shows the necessity for graduating men from our schools of such mental attainments that they in turn will be able to carry on this great work of public health.

CONCLUSION.

In closing my report, I wish to remind you that no matter what efforts you put forth or what sacrifices you may make, you will hear the voice of criticism and denunciation shouting at your back and exerting every influence to divert you from your course, and stay the power for advancement held in your hands. If the criticisms which have been made have struck the mark, and cannot be removed by means of the agencies I have suggested in this report, then we may rightfully be considered as being misplaced in educational work. I retire from the presidency of this association today with a feeling of deepest gratitude to all its members for the stanch support which each has given in its work. I cherish the friendships it has made, and as I have heard it said many times that one never accomplishes anything that is worth while without making enemies, I even appreciate the enemies.

Being deeply appreciative of the trust you have reposed in me by making me your president, I cannot help but feel, with the advancement of our profession at heart, that the goal toward which we are struggling will be far sooner reached in the hands of my successor, whose broader and deeper knowledge of educational matters will be more far-reaching in its influence in bringing about the much-desired standard for our profession.

The request for recognition by the Tokyo Dental School was next taken up for consideration, and a letter from the dean, Dr. Chiwaki, was read.

Dr. Kirk moved, and Dr. Owre seconded, that this matter be referred to the Educational Committee, with instructions to take up the consideration of the subject with the department of Professional Education at Washington, and if the representations made in the letter of the dean of the Tokyo Dental School are found to be substantially correct and in accordance with the facts, that this association accord to the graduates of the Tokyo Dental School advanced standing in the senior year in the schools of this association.

The motion was discussed and carried.

With regard to the transfer of students from one school of the association to another, as considered in the President's address, after some discussion of the matter, Dr. Kirk moved, and Dr. Owre seconded, that this body recommend, in all cases of transfer from one school to another, that the dean of the school transferring the student shall accompany the transfer with a letter giving full particulars as to the general character and value of the man and his work, and shall also state whether the student has been honorably dismissed.

The motion was duly made and carried.

Motion was then made and carried to adjourn until the afternoon session.

Second Session.

The association was called to order on Monday, January 22d, by the vice-president, Dr. Smith, at 2.30 P.M.

The question of the work of the National Mouth Hygiene Association was taken up and discussed, but no action was taken thereon. It was the sense of the association, however, that the question of educating the public, and especially high-school students, in the necessity and advantages of dentistry, and the opportunities presented to young men in entering dentistry as a profession, could best be promoted in an individual way by the members of the association, rather than by the association taking any active part in the work of the National Hygiene Association.

Dr. Hoff moved, and Dr. Owre seconded, that the address of the President be adopted and printed as read, with the recommendations made therein. (Motion carried.)

The next order of business was the report of the secretary-treasurer, Dr. Edward C. Kirk, as follows:

Report of the Secretary-Treasurer.

To the President and Members of the Dental Faculties Association of American Universities,—As secretary-treasurer, I have the honor to report that the business matters which have devolved upon the secretary-treasurer other than the routine work of his office have been relatively unimportant for the period which has elapsed since the last meeting of our association.

APPLICATION FOR MEMBERSHIP IN F. D. I. WITHHELD.

In my previous report, the status of the action of the association taken at its meeting in 1910 relative to a formal application for membership in the International Dental Federation was referred to and later discussed by the association, with the result that, upon resolution by Dr. Owre, seconded by Dr. Smith, the formal action of the association in applying for membership in the Fédération

Dentaire Internationale was rescinded, and the application for membership was directed to be withdrawn. As the secretary was duly instructed to inform the Federation of this action, and as he had arranged to be present at the meeting of the F. D. I. in August of 1911, it was deemed best to make a verbal explanation to the officers of the F. D. I. of the action taken by this body, which was accordingly done at the London meeting, with the result that the application for membership in the F. D. I. by this body was not presented for action at the London meeting.

TOKYO DENTAL COLLEGE.

Your secretary has received a further communication from President Chiwaki, of the Tokyo Dental College, with reference to the application made by him for recognition of the qualifications of graduates of the Tokyo Dental College to the extent of admitting such graduates to the third-year class in colleges holding membership in the Dental Faculties Association of American Universities. It appears from the letter of Dr. Chiwaki that he has also communicated with Dr. Sharp upon the same subject. The question raised by Dr. Chiwaki was, by resolution at the last meeting, referred to the Educational Committee, and in view of the renewed inquiry by the president of the Tokyo Dental College, your secretary would suggest that the association endeavor to reach a definite conclusion upon and a final disposition of the matter at this meeting.

EVALUATION OF CERTIFICATES OF PRELIMINARY EDUCATION.

Another question of practical importance to the smooth conduct of the interrelationships of the several members of this body is concerned with the question of the mutual acceptance of certificates of preparatory education relating to students who desire to be transferred from one school to another within the membership of the association.

It is mutually understood as a fundamental principle that the matriculation standard of schools holding membership in this body is, or should be, of such uniformity as to make certificates of preparatory education issued by one school of this association acceptable to all of the others, and while this principle is theoretically sound, yet in its practical application difficulties have arisen and are arising which necessitate a careful revision of this question as to the details of its application in particular cases.

In Pennsylvania, for example—and it is also true of other states—there exists a state law necessitating that the preliminary educational qualifications of the candidate for admission to professional schools of medicine, dentistry, and pharmacy shall be evaluated by an official examiner, who is the appointee of the superintendent of public instruction of the state, and in order that such evaluation or grading of credentials may be fairly done, it becomes necessary that a detailed exhibit of the preparatory school work of the candidate shall be presented to the state examiner. The University of Pennsylvania has in some instances met with difficulty in adjudicating the standards of preliminary education of men who have been admitted to schools of this association under the regulations of the institution or state from which they come, by reason of the fact that the credentials presented by such candidates for advanced standing have not been sufficiently specific and detailed in order to enable the state examiner or the dean to intelligently arrive at a fair evaluation of the applicant's certificate.

It would seem, therefore, that a revision of this question, particularly as to the character of the certificates of preparatory education which may be interchangeably acceptable among schools holding membership in this association, is not only desirable, but important as part of the work of the present meeting.

PROPOSED AMENDMENT OF CONSTITUTION AND BY-LAWS IN REGARD TO KEEPING RECORD OF ALL MATRICULANTS.

The secretary-treasurer desires to call the attention of the association to the provision in Section 4, Article V, of the constitution and by-laws, defining the duties of the secretary-treasurer as follows:

> He shall keep a record of matriculants in all colleges members of this association, giving name, age, address, and preliminary qualifications of each matriculant, lists to be furnished by the dean of each college, together with the announcement for that year, within sixty days after the opening of the college—said list may be published as a reference in the annual proceedings.

In view of the practical difficulties in the way of securing such a record as the above-quoted section indicates—one that shall be reasonably accurate—and in view of the questionable utility of such a regulation, your secretary-treasurer suggests the propriety of its revision so as to bring the regulation within the limits of practical efficiency, or otherwise its elimination as being useless in its present form.

FINANCES OF THE ASSOCIATION.

The financial condition of the association is set forth in the following detailed report of receipts and expenditures:

Receipts:		
Balance from 1910-11	$53.28	
Receipts for dues 1911-12	300.00	
Total receipts		$353.28
Expenditures:		
Nov. 1. Printing Transactions	$50.00	
Nov. 13. Clerical services	200.00	
Dec. 1. Envelopes for mailing transactions	.50	
Jan. 18. Telegrams	3.05	
Postage	2.24	
Total expenditures		$255.79
Balance 1911-12		$97.49

The publication of the proceedings of the several meetings has been attended to as provided for by resolution at the last meeting, and copies have been sent to each of the members of this association and to educational bodies generally.

All of which is respectfully submitted,
EDWARD C. KIRK, *Sec'y-treasurer.*

The question of membership in the Fédération Dentaire Internationale was left in its present stage for the present, *i.e.* that application for membership was not presented.

The matter of the Tokyo Dental School had already been disposed of in connection with the President's address.

The question of exchange of certificates of schools within the association was discussed again, and the matter considered settled as agreed upon in the consideration of the President's address.

With regard to Section 4, Article V, of the constitution and by-laws, as referred to in the secretary's report, Dr. Owre moved, and Dr. Hosford seconded, that this be stricken from the constitution and by-laws. (Motion carried.)

Dr. HOFF then moved that the report of the secretary-treasurer be adopted and recorded in the records of the meeting.

The Executive Committee was called upon for a report, and Dr. HOFF, chairman, reported as follows:

REPORT OF THE EXECUTIVE COMMITTEE.

The Executive Committee has had no business before it during the year, and we therefore have no report to make, except on providing the place and time for the present meeting, and that report you have before you.

The report of the Executive Committee was approved.

Dr. SMITH, chairman of the Educational Committee, reported as follows:

REPORT OF THE EDUCATIONAL COMMITTEE.

The committee was to report upon the Tokyo School, but as that matter has been considered before the body as a whole, and has been referred back to the Educational Committee, we have no further report to make.

The report of the Educational Committee was approved.

Dr. HOSFORD called attention to the resolution passed at the last meeting inviting the investigation of the teaching methods of the schools of the association by the Carnegie Foundation for the Advancement of Teaching, and asked if any action had been taken on the resolution.

The Secretary reported that, through an oversight, the substance of this resolution had not been transmitted to the Carnegie Foundation, but that he would proceed to send the resolution to the Foundation at the earliest possible date.

Dr. HOSFORD asked if any action had ever been taken by the association in regard to accepting students from schools which were not members of the association.

The records of the association did not show that any specific action had been taken on this question, and after some discussion, Dr. HOSFORD, seconded by Dr. Owre, presented the following motion:

RESOLVED, That students from American schools not holding membership in this association may be admitted to schools holding membership in this association, providing their preliminary training is equal to the training required of students seeking admission to our university schools, and that they be given credit for the time they have spent in dental study, but that no credit be given for any professional subject they may have taken in that school; also that they must pass examination in all subjects of the required course.

The motion was carried.

The question of uniformity of curriculum was discussed, and in this connection Dr. Hoff announced that he had prepared a statement of what was taught at Michigan and how it was taught, and hoped to have an opportunity to present this to the association.

Dr. KIRK moved that Dr. Hoff's communication be made the special order of business for the evening session. (Motion carried.)

ELECTION OF OFFICERS.

The next order of business was the election of officers for the ensuing year, which resulted as follows:

President—Dr. Eugene H. Smith.

Vice-president—Dr. N. S. Hoff.

Secretary-treasurer—Dr. Edward C. Kirk.

Executive Committee—Dr. W. S. Hosford (one year), Dr. N. S. Hoff (two years), Dr. E. H. Smith, *ex officio*.

Educational Committee—Dr. J. G. Sharp (one year), Dr. E. C. Kirk (two years), Dr. Alfred Owre (three years), Dr. E. H. Smith, *ex officio*.

Motion was made and carried to adjourn until the evening session.

Third Session.

The meeting was called to order on Monday, January 22d, at 9.30 P.M., by the president, Dr. Smith.

The evening session was devoted to the reading of a paper by Dr. N. S. HOFF, entitled "The Curriculum of the College of Dental Surgery of the University of Michigan," as follows:

THE CURRICULUM OF THE COLLEGE OF DENTAL SURGERY OF THE UNIVERSITY OF MICHIGAN.

To the Dental Faculties Association of American Universities,—With your permission I desire to present in this formal way a brief statement of the curriculum that we are endeavoring to teach in Michigan University, with the hope that it may draw your criticisms and provoke a beneficial discussion of this vital subject. Our curriculum, you will observe, is to some extent dependent on our circumstances, but in the main it is the result of the gradual development of years of experience and much thoughtful consideration, and also of free interchange of views and experiences with other men and institutions. While we realize that at the present time it may not be practicable or wise to undertake to establish a universal curriculum that is identical in all our institutions in every detail, there may be advantages worth while for the six schools represented in this body in erecting a standard of education that shall have national, if not international, recognition as being typical of the best that our country maintains.

We do not think this an unworthy or impracticable ambition; in fact, I doubt not that many of you have been many times reminded by members of the profession that something worthy and desirable in the establishment of higher professional training is expected from this organization, and where would the foreigner expect to find the highest standards except in university schools?

It would seem, then, highly desirable that we should begin by making a thorough investigation of our work, as to what sort of training we are individually and collectively offering. I trust, therefore, that I shall not tire you by rehearsing, as briefly as may be consistent with adequate statement, the actual work done in this school. I have prepared a statement giving in tabular form the hours scheduled in the several subjects, which you will kindly consult in connection with this reading. I will take up each subject in its chronological order, that you may follow our idea of the sequential grouping of subjects and some of the reasons therefor.

First Year.

GENERAL PRINCIPLES OF ARRANGEMENT OF CURRICULUM.

Without discussing at length all the reasons for the form as well as the substance of our curriculum, we shall present it by subjects in the order followed in the course. Because we have found it difficult for high-school students who have been trained to follow closely text-book instruction to grasp the didactic or lecture form of instruction, and because a large majority of students entering our school have never had any other kind of instruction than text-book work, we have thought it wiser to lead them gradually into the more difficult scientific subjects, after they have learned university teachers' methods to some extent. We have therefore adopted the plan of occupying the major portion of the time of the first-year student in the development of technical skill, and of limiting his scientific studies to not more than two general subjects. At present we teach the following subjects in our first or freshman year. [See Tables I and II.] You will observe that our students take lecture and laboratory work in inorganic chemistry during the first semester as their only class studies; the remainder of the time is devoted to technic work in the prosthetic laboratory. In the second semester, the chemistry course is continued as a lecture course in organic chemistry, and a laboratory course in qualitative chemistry. Histology is also given in the second semester, and the balance of the time is used to complete the course in prosthetic technics.

Inorganic chemistry. The course in inorganic chemistry is given in four lectures or recitations of an hour each, and two afternoons of laboratory work each week. The lectures are all illustrated by demonstrations, and the text-book used is Smith's "College Chemistry." The aim is to present as thoroughly as possible the general principles of the chemistry of the essential elements and their principal compounds, especially showing their combining and other chemical and physical properties. In the laboratory course, students make such experiments as they can to impress upon them the principles of general chemistry in the preparation and study of the peculiarities of the important elements in compounds and isolated. No attempt is made to teach technical application, but thorough grounding in general chemical principles only is taught. The course is given by Professor Lichty.

Qualitative chemistry. This is taken after the student has completed his general inorganic chemistry, the idea being, by teaching chemical analysis, to impress the principles of chemical combinations and reactions. Two lectures or quizzes of one hour each are given each week, and two half-days each week during the second semester are spent by the student in laboratory experimentation. The following outline will indicate the scope of work done:

(1) Writing and naming of salts, acids, and bases.

(2) A study of valences, colors, solubilities.

Table I.

SHOWING ALLOTMENT OF TIME.

FRESHMEN.

Subject.	Lectures.	Laboratory.	Per cent.
Inorganic chemistry	4 × 17 = 68	132	13
Qualitative "	2 × 17 = 34	132	11
Organic "	4 × 17 = 68	...	5
Histology	4 × 10 = 40	160	13
Prosthetic technics	3 × 34 = 102	660	51
	312	1084	93

(34 weeks × 44 hours = 1496 working hours per year. 8 hours per day, 5½ days = 44 hours per week.)

Available hours .... 1496—or 100 per cent.
Scheduled " .... 1396 " 93 " "

Lost .... 100 " 7 " "

JUNIORS.

Subject.	Lectures.	Laboratory.	Total.	Per cent.
Prosthodontia	4 × 17 = 68	...	68	4½
Dental anatomy	2 × 17 = 34	...	34	2¼
Operative technics	18 × 13 = 59	195	234	15¾
Bacteriology	25 × 8 = 40	160	200	13¼
Orthodontia technics	20 × 4 = 12	68	80	5¼
Physiology	5 × 17 = 85	...	85	5½
Crown and bridge work	3 × 17 = 51	...	51	3½
Materia medica	2 × 17 = 34	...	34	2¼
Anatomy	25 × 10 =	...	250	16¾
Operative clinic	30 × 10 =	...	300	20
Pathology	3 × 17 = 51	...	51	3½
			1387	92½

Available hours .... 1496—or 100 per cent.
Scheduled " .... 1387 " 92½ " "

Lost .... 109 " 7½ " "

SENIORS.

Subject.	Lectures.	Laboratory.	Total.	Per cent.
Surgery and hospital	3 × 34 = 68	34	102	6¾
Operative principles	2 × 34 = 68	...	68	4½
Therapeutics	2 × 34 = 68	...	68	4½
Pathology and laboratory	3 × 17 = 51	60	111	7½
Orthodontia	2 × 17 = 34	...	34	2¼
Porcelain	2 × 34 = 68	...	68	4½
Crown and bridge and clinic	1 × 34 = 34	180	214	14¼
Prosthodontia	....	180	180	12
History and ethics	2 × 17 = 34	...	34	2¼
Operative clinic	18 × 34 = 612	...	612	41
			1491	99½

Available hours .... 1496—or 100 per cent.
Scheduled " .... 1491 " 99½ " "

Lost .... 5 " ½ " "

Table II.

FIRST YEAR—FIRST SEMESTER, October 3, 1911, to February 9, 1912.

	MONDAY.	TUESDAY.	WEDNESDAY.	THURSDAY.	FRIDAY.	SATURDAY.
8	General Chemistry.	General Chemistry.	Technic Demonstration.	General Chemistry.	General Chemistry.	Technic Demonstration.
9	Prosthetic Technics, each forenoon from 9 to 12.					
10						
11						
1 to 5	General Chemistry.	Technics.	Technics.	Technics.	General Chemistry.	

FIRST YEAR—SECOND SEMESTER, February 12 to June 15, 1912.

	MONDAY.	TUESDAY.	WEDNESDAY.	THURSDAY.	FRIDAY.	SATURDAY.
8	Organic Chemistry.	Organic Chemistry.	Technic Demonstration.	Organic Chemistry.	Organic Chemistry.	Qualitative Chemistry. 8-12
9	Prosthetic Technics, each day, except Saturday, from 9 to 12.					
10						
11						
1 to 5	Histology.	Histology.	Qualitative Chemistry.	Histology.	Histology.	

(3) A study of characteristic reactions of common metals and acids.

(4) Application of principles relating to solubilities.

(5) Balancing of equations in analysis of bases and acids.

(6) Study of oxidation and reduction with equations.

(7) Elementary work on theory of ionization, law of mass action, and simple problems.

(8) Analysis of "known" solutions.

(9) Analysis of 40 "unknown" solutions.

Prescott and Johnson's text-book is used. The course is given by Instructor Cole.

Organic chemistry. This is given in the second semester, immediately following the inorganic course and running concurrently with the course in qualitative chemistry. The work extends through the semester with lectures and recitations, four times a week in all. An attempt is made to cover the general principles of classification, reactions, and preparations of various organic compounds. While more or less attention is being paid to such subjects as are of importance in physiology or pharmacology, the principal stress is laid upon the scientific principles of the subject of organic chemistry as such. The work covered is equivalent to what is presented in Remsen's well-known short "Text-book of Organic Chemistry." The course is given by Professor Gomberg.

Histology. This is a combined lecture

and laboratory course in general embryology and histology, and is given every afternoon from 1 to 6 o'clock for twelve weeks in the second semester. The textbook used is Huber's "Histology." The first hour is used as a lecture, and the last hour as a quiz. Students stain, mount, and study with the microscope sections of all the important tissues in the body, and make drawings in their note-books, and these are carefully inspected and marked. Sections showing carefully prepared tooth tissues in development and complete calcification are projected with the micro-lantern and are demonstrated. Students make a tooth section for themselves. This course is given by Professor Huber in the histological laboratory of the medical department.

Prosthetic technics. This course occupies most of the time of the first-year students, as will be seen by consulting the tables. The course is given by Instructor Whitman. The usual technic work is covered by taking impressions with three materials, carving teeth in plaster, vulcanite plate work, cast metal plates, swaged plates, obturators and splints, and includes the usual forms of crown and bridge work. An exhibit of the extent and character of this work can be seen in the exhibit case in the technic exhibit room. The method of instruction consists in demonstrating each piece of work before the class and explaining its construction, and the student then executes for himself the work demonstrated. The demonstrations are materially augmented by projections of pictures, models, etc., with the epidiascope, which is a most useful teaching adjunct. This course is used by us not only to impart knowledge and cultivate skill in handicraft, but to test the capacity of students in technical dentistry, and, by concentrating the work in the first year, we are able to determine whether it is wise for all freshmen to continue the study of dentistry, and to advise them accordingly.

Are we concentrating instruction unwisely on a few science subjects and giving unnecessary time to instruction in technics in our first year?

Junior Year.

In the junior year we introduce more science subjects, and a wider variety of technical subjects. [See Tables I and III.]

Prosthodontia. This is a course of lectures continuing the instruction begun in the freshman year as a technical course. It consists of four lectures each week during the first semester. The course follows substantially the course given in technics, except that no lectures are given in crown and bridge work. The principles of constructing and adapting various kinds of prosthetic dentures are rehearsed and amplified, special attention being given to the materials involved and their adaptation from the technical, sanitary, and professional considerations. The text-book used is Wilson's "Manual." This course is given by Dr. Hoff.

Dental anatomy. The course in human dental anatomy is given twice a week, during the first semester by Dr. Howell. The work in the first half of the semester consists of quizzes, interspersed with lectures, embracing the work as found in the first eleven chapters of Broomell and Fischelis' "Dental Anatomy."

In the second half of the semester, the students are quizzed on the anatomy of the teeth, using the above book and Black's "Dental Anatomy" as text-books.

In addition to this, sections of all the teeth are ground for the purpose of technical study.

Comparative odontology. The course of comparative odontology consists of lectures, two hours a week, in which all animals are considered from the following standpoint: (1) The animal. (2) Its environment. (3) Its masticatory apparatus, embracing the muscles of mastication, temporo-mandibular articulation, glands, etc. (4) Its dental formula. (5) Form of teeth. (6) Structure of teeth. (7) Attachment of teeth. (8) Functions of teeth. These facts are considered and compared with the human teeth, the evolution and adaptation of the teeth to suit the animal's environment being made clear. This work is

Table III.

SECOND YEAR—First Semester, October 3, 1911, to February 9, 1912.

	MONDAY.	TUESDAY.	WEDNESDAY.	THURSDAY.	FRIDAY.	SATURDAY.
8	Prosthodontia.	Dental Anatomy.	Prosthodontia.	Dental Anatomy.	Prosthodontia.	Prosthodontia.
9	Operative Technics.		Operative Technics.			
10 11	Operative Technic Laboratory—October 3 to February 9, 1912.					
1 to 5	Orthopedic Technics—Daily, October 5 to November 25, 1911.			Bacteriology Laboratory—Daily, December 4th to February 9th.		

SECOND YEAR—Second Semester, February 12 to June 15, 1912.

	MONDAY.	TUESDAY.	WEDNESDAY.	THURSDAY.	FRIDAY.	SATURDAY.
8	Physiology.	Physiology.	Physiology.	Physiology.	Physiology.	
9	Pathology.	Crown and Bridge.	Pathology.	Crown and Bridge.	Pathology.	Crown and Bridge.
10	Materia Medica.		Materia Medica.			
11	Prophylaxis and Therapeutic Clinic—February 14th to June 8th.					
1 to 5	Dissection—Daily, February 12th to April 13th.			Operative Clinic—Daily, April 15th to June 8th.		

greatly enhanced by the presence of the Ford-Mitchell Museum, which contains examples of all classes of animals. This course is given by Dr. Howell.

Operative technics. This course is given as a laboratory exercise in the forenoons, three hours each day for twelve weeks. It embraces demonstration by the instructor and laboratory exercises in studying tooth forms, sectioning human teeth, cavity preparation for root-canal work, and cavity preparation in bone teeth set in articulated full-dentured typodonts; study of and the introduction of various cavity and canal filling materials; making of instruments from bar steel, and the use of hand instruments in cavity preparation. The cavity preparation is studied in large models for fillings and inlays. This course is given by Instructor Whitman. No text-book is used.

Orthodontia technics. This is a course of model-making, soldering, and adapting the Angle regulating appliances. Impressions are taken with plaster, and orthodontists' models are made from them. The arches, band, and screws are bought from the manufacturers, and the students make bands of various kinds, and adjust the arches to the typodonts. From four to five weeks are devoted to this work. Students are advised to read Angle's text-book, and the principles of orthodontia required in appliance construction are made known in the demonstration lectures.

Bacteriology. This course is given by Professor Novy in the bacteriological laboratory. The course in bacteriology as given to the dental students covers a period of eight weeks. The entire afternoon from one to six o'clock is devoted to instruction in this subject. The first hour is usually taken up with a lecture in which the work of the day is outlined, and, in addition, special topics are discussed. The effort is made in the forty hours devoted to lecture work to present the fundamental principles of bacteriology and immunity. To some extent the recent work on pathogenic protozoa is included in the subjects discussed.

The last hour of the afternoon is devoted to recitation on the work of the laboratory and the subject of the lecture, and on special chapters which have been previously assigned for study.

The laboratory work proper requires three hours daily, six times a week. In this work the student is taught to prepare his own cultural media, to make cultures of bacteria, molds, and yeasts from various sources, and he is especially given a number of non-pathogenic organisms which not only serve to acquaint him with the properties of this group of organisms, the methods of staining and examination, but also fix the principles of sterilization and disinfection. This work on non-pathogenic forms is preliminary to the study of pathogenic bacteria proper. The work on the pathogenic bacteria covers the most important of the disease-producing organisms, such as the pus-producing bacteria, the germs of anthrax, cholera, pneumonia, tuberculosis, typhoid fever, etc.

The student who has thus covered the non-pathogenic and pathogenic organisms is in a position to undertake in an intelligent way a study of the organisms which are met with in the mouth and in other conditions, and at the same time is grounded in the important principles underlying the prevention of disease.

Physiology. The dental students are taught physiology by lectures, accompanied by demonstrations, and by recitations. The lectures are given five times a week for one semester.

The course includes a brief review of the chemical constituents of living matter, the general characteristics of protoplasm, the composition of blood and its physiological functions, the method of action of glandular, muscular, and nervous tissues. After this general introduction into physiology, a more detailed study of the great systems of the body is taken up in the following order:

(1) The movements of the alimentary canal, digestion, absorption, assimilation, diet, and nutrition.

(2) The glands of internal secretion, the method of action of the excretory organs—the liver, kidney, and skin.

(3) The mechanics of respiration and of gaseous exchange between the lungs and the tissues.

(4) A study of the circulation, including the action of the heart and its valves, the normal heart-sounds, the blood-pressure and the pulse, and the nervous regulation of the heart and bloodvessels.

(5) Finally, the character and physiological activities of the central nervous system, embracing the method of transmission of impulses, reflex processes, and the functions of the cerebrum, cerebellum, and spinal cord.

The student is expected not only to see the experiments which are given in the course, but to take notes, and from time to time to hand in written reports of the results of the experiments.

About one hundred tests and experiments are performed during the lectures; these are made before the class in an amphitheater so constructed that all can readily see the work, or in case of certain experiments, of a type not to be seen from a distance, the preparations are demonstrated to the individual members of the class. These tests and experiments illustrate the following:

The reactions of carbohydrates, fats, and proteins; the structure and chemical reactions of the blood; muscular contractions, reflexes; movements of the alimentary canal; the action of saliva, gastric, and pancreatic juice; the chemistry of the urine; the physical processes of respiration, of heart action, the pulse, and the conditions governing blood pressure.

Frequent reviews of the ground covered are secured by oral and written quizzes, and the students are encouraged to read text-books more advanced than Wiggers' "Brief Text-book of Physiology," which is the text-book employed in connection with the daily work of the course. This course is given by Instructor Cope of the physiological laboratory.

Dental pathology. The course in pathology is taught by means of two lecture and one laboratory courses. One lecture course is given to the juniors in the second semester of the junior year, and another course to the seniors during the first semester of the senior year. The time occupied is three hours per week in each course for a semester.

The ground covered in these courses is the consideration of the various pathological processes in the mouth, and their connection with the general bodily processes. A short *résumé* of the general pathology is made, a review of the development and structure of the tissues of the mouth, and then the various dental diseases are considered in detail from a pathological standpoint. The lectures in the junior year are given for the purpose of presenting a general view of these subjects to the student before he enters upon active practice in the clinic, he being required to prepare an accurate note-book from these lectures, covering the subjects treated. In the senior year the same ground is covered more carefully in the form of a quiz, using Burchard and Inglis' "Pathology" as a textbook.

The laboratory course consists of from eight to ten demonstrations before small sections of students, using the stereopticon and requiring that the student make forty ink-drawings of various pathological sections. This course is given in the first semester of the senior year by Professor Bunting.

Crown and bridge work. Two lecture courses are given, one being a course of three lectures a week for one semester to the junior students, embracing the principles involved in the construction and adaptation of various forms of crowns and bridges. Goslee's text-book is used. The other comprises one lecture a week of a clinical character throughout the senior year. Demonstrations or clinical illustrations are utilized in the discussion of peculiar or variant methods in special cases which appear in the clinic. The clinic is held four days each week from ten to twelve o'clock, when practical cases are treated by the students.

Materia medica. This is a course of two lectures each week during the second semester of the junior year. All drugs which are used in dental practice are exhibited, and described with particular reference to their pharmacology and dental applications. Instructor Harper, a dentist, gives this course.

General anatomy. This course is given as a combined lecture and laboratory course in the junior year. The time devoted to it is twelve weeks each afternoon from one to six o'clock. Students make dissections of the head and thoracic and abdominal viscera. As each region is dissected, the osteology is studied from the bones involved, which are loaned to students for use in their rooms. Daily conferences and quizzes explain and enforce the technical work. A brief guide to the parts involved is furnished the student, and he is required to do reading in anatomical text-books. The lectures are given at the beginning of each day's work. Professor Streetor and his demonstrators give this course in the anatomical laboratory.

Junior clinical work. During two hours of the forenoon in the second semester, and the afternoons from April 15th to the close of the session, the junior students begin operative work in the clinic. They serve as assistants to the seniors, and begin clinical work with oral prophylaxis of the simpler cases. They also make fillings in easy cavities. Enough work is done to insure that at the beginning of their senior year the students shall already have become familiar with operative procedures and the handling of patients.

Table IV.

THIRD YEAR—First Semester, October 3, 1911, to February 9, 1912.

	MONDAY.	TUESDAY.	WEDNESDAY.	THURSDAY.	FRIDAY.	SATURDAY.
8	Surgery.	Surgery.	Operative Principles.	Therapeutics.	Operative Principles.	Therapeutics.
9	Pathology.	Orthodontia.	Porcelain.	Crown and Bridge.	Pathology.	Pathology.
10						
11	Plate, Crown and Bridge, and Orthodontic Clinic Daily.		Hospital Clinic.			
1 to 5	Operative Clinic—Daily except Saturday.					

THIRD YEAR—Second Semester, February 12 to June 15, 1912.

	MONDAY.	TUESDAY.	WEDNESDAY.	THURSDAY.	FRIDAY.	SATURDAY.
8	Surgery.	Surgery.	Operative Principles.	Therapeutics.	Operative Principles.	Therapeutics.
9		History and Ethics.	Porcelain.	Crown and Bridge.		History and Ethics.
10						
11	Plate, Crown and Bridge, and Orthodontic Clinic Daily.		Hospital Clinic.			
1 to 5	Operative Clinic—Daily except Saturday.					

Senior Year.

The senior year is devoted almost entirely to instruction in clinical work, and consists of lectures on clinical subjects and clinical practice in all subjects. [See Tables I and IV.]

Oral surgery. This subject is taught by lectures, quizzes, clinical lectures, and clinics. The lecture course comprises two lectures and one clinic a week throughout the year, and embraces the following subjects:

(1) The action and use of general anesthetics.

(2) Inflammation and general infectious diseases.

(3) Tumors in the oral region.

(4) Syphilis in its relation to dentistry.

(5) Special diseases of the mouth and throat.

Arrangements have been made at the University General Hospital whereby all cases of interest to the dental students can be presented in the clinic, and dental students have free admission to all clinics. A state law provides for the treatment of congenital deformities at the university hospital, and a large number of cases of cleft palate and hare-lip are sent here for operations. These, together with many cases of tumors and dentigerous cysts and operations upon the teeth, make this clinic one of exceptional value to dental students. All patients of the hospital are accessible for examination and study in research problems concerning the mouth and teeth, and many cases of great interest to dentists present every year. Professor Darling and Dr. Lyons have charge of this course.

Operative principles. This is a course of two lectures each week given by Professor Ward. It consists of a discussion of the nomenclature, the operative field, forces and forms of energy, stress, strain, and resistance with reference to forces applied to teeth in varying conditions; structure and composition of teeth with respect to forces applied, etc.; nature of filling materials, and the establishment of a standard for judging materials. A discussion of the several individual filling materials is then given. A full study is made of the value of gold as a filling material, and as a standard of judging other materials. The other filling materials, such as tin, porcelain, amalgam, cements, gutta-percha, etc., are fully considered as to their physical properties and adaptability as practical filling materials.

Porcelain course. The course in porcelain consists of one lecture each week, and one demonstration in technical work each week, during the first semester. In the lecture course, the history of porcelain in general, and the history of dental porcelain is taken up, followed by a study of the composition, characteristics, etc., of the different porcelain bodies. The different furnaces are studied, and methods of ascertaining the fusing-point of porcelain are discussed. The color problems are studied by showing the relation of light to color, and, in this connection, the properties of light that affect the color of porcelain are illustrated. Practical lectures in porcelain crown and bridge work are given, and two or three lectures are offered on cavity preparation, showing how cavities prepared for porcelain differ from those prepared for other filling materials. The technical course follows along with the lecture course. The students have an opportunity in this course to learn the manipulation and practical application of porcelain in the construction of crowns and inlays on models. Two hours a week throughout the second semester are devoted to practical work upon patients, each student being required to make at least one satisfactory inlay before passing the course.

Dental therapeutics. The lecture part of the course is given as a two-hour lecture and quiz course during the entire senior year. Special attention is given to the classification, the action and the uses of drugs and agents that are important. The action and practical application of agents in classes is emphasized rather than the agent itself.

At regular intervals demonstrations are given illustrating the practical application or administration of agents by different methods and for specific purposes. Special attention is also given to prescription writing and the practical application of the metric and English systems of weights and measures with laboratory demonstrations. A few demonstrations are given in urinary analysis and the detection of unknown drugs; fifty of the most common drugs, unlabeled, are at all times on exhibition in the therapeutic laboratory.

Clinical demonstrations at the chair are held from 1.30 to 5 o'clock, five times a week during the entire year. Quizzes on the practical application of drugs or agents or methods are given each student as occasion arises. Aseptic and antiseptic methods of treatment are rigidly enforced, and credits given for same. Quality rather than quantity as to the character of work is thoroughly impressed upon the student.

From October until the Christmas vacation practical demonstrations on patients are executed before the entire class. These are given in the lecture room, twice a week, before beginning the afternoon's work and are as follows:

A practical demonstration in the technique of oral prophylaxis; pulp removal by different methods; root-canal filling; treating putrescent pulps, pulpitis, etc.; treating abscesses of various kinds; treating pyorrhea alveolaris; the extracting of teeth; bleaching of teeth by different methods; treating hypersensitive dentin; the administration of anesthetics.

Daily demonstrations are held in the use of the X-ray apparatus for diagnosing obscure pathological conditions, root-canal fillings, etc., also several demonstrations with X-ray apparatus before the entire class, illustrating both the theoretical and the practical features involved, Long's and Buckley's text-books being used. This course is given by Professor Loeffler.

Prosthodontia clinic. In this course the students do plate work and treat orthodontia clinical cases. The plate cases are assigned to a section of twelve seniors for periods varying according to the number of students in the senior class, and also as the plate work comes in. We plan to have each senior make a full upper and lower plate with vulcanite or metal bases, and such partial dentures and repair cases as may develop in the clinic during each period. The orthodontia cases are assigned to such students as express a preference for them, but an effort is made to have a case in each section of the clinic room, so that every student may have a chance to observe and follow the treatment of the case if he desires. We have found that it is impracticable to undertake the treatment of more than thirty cases, as almost every treatment requires the advice of the instructor. An effort is made to take as far as is practicable such cases as may be carried through the treatment during one year, or as can be retained through the summer vacation. This clinic is under the supervision of Dr. Hoff.

Orthodontia lectures. The lecture course in orthodontia is given by Dr. M. T. Watson of Detroit, and consists of one lecture hour and one hour for inspection of patients and directions for treatment each week. The directions for treatment are recorded by a stenographer, and three copies of the dictation are transcribed, one for the students, one for the clinical instructor, and one for record.

An endeavor is made in this lecture course to convey to the students a clear conception of normal occlusion and of the normal development of all the adjacent structures both of the internal and external face; at the same time to outline briefly the possibilities and value of normal function for all these parts, and the importance and far-reaching effect of normal breathing, which is only possible when these structures are at least moderately well developed.

We then show by pictures and descriptions the evil influences of malocclusion, which is not a separate and distinct condition in itself but is merely an evidence or symptom of a deeper and a more far-reaching evil influence—namely, a developmental disturbance of the structures of the internal face. In this connection the baneful influences of a restricted breathing capacity and also the associated nervous influences are dwelt upon to some extent.

We also dwell at considerable length upon and show by a large number of pictures the dire consequences of the premature loss of deciduous teeth. The loss of permanent teeth may be considered premature up to seventy-five years of age, though of course the evil influences are much more pronounced during childhood. In addition we are studying the classification of malocclusion and the general principles involved in the correction of the various classes, all these lectures being illustrated with the stereopticon lantern.

Owing to the exceedingly exacting nature of this work, the writer believes that out of consideration for the patient, it is highly important that a trained man, with ample time at his command, should be put in constant charge of a clinic of this sort, and that even the simplest adjustments should not be made except under his personal supervision and direction. If it is not possible to do the work this way, then I believe it should be conducted as a surgical clinic is—viz, the operator in charge of the work making absolutely all the adjustments—for in no other way does it seem possible to accomplish ideal results, and at the same time save the patient from a vast amount of needless discomfort.

By this course as outlined it is intended that students shall be taught only the more important and conspicuous features of the pathology involved, no attempt being made to go into the details of the work to the degree which is necessary in order to develop trained specialists. The subject is taught rather with the idea of impressing in the most forceful manner possible the value and importance of a normally developed internal face, involving, of course, normally developed jaws and teeth, and of emphasizing the profound effects of early attention in the way of the correction of these conditions, incidentally showing the students in the clearest possible way the evils following extraction and lack of proper contour in fillings, crowns, etc.

Clinical operative dentistry. Clinical operative dentistry is taught in the operating room at the chair, and by a course of lectures on clinical procedures covering about twenty hours, all of which are given at the beginning of the session. In these lectures the instruments used are described; the methods of handling patients discussed; examinations for caries, placing of rubber dams, and the various methods of isolating the teeth and reasons for so doing; the opening of cavities and their formation for filling materials; the introduction of various filling materials, and the finishing of fillings; the technique of root-canal work; the treatment of the teeth and peridental structures; extracting; the X ray in diagnosis; prophylaxis; gold and porcelain inlay filling—these and other similar and customary procedures are discussed. About 600 hours are devoted to this work in the senior year. Professors Hall, Loeffler and Ward, and four demonstrators, are in charge of the clinic every afternoon except Saturday from 1.30 to 5 o'clock. Each student is assigned a chair at the beginning of the year, and he is taught to handle his patients in such a way as to give him experience and training for private practice. Complete records are kept of each student's work, and these enter largely into the required attainments he must make for graduation. After the Christmas holidays every filling made by the student is graded and marked. The roll is taken every day, and any student who is absent more than three days must make satisfactory excuse to the attendance committee; this also applies to all the lecture courses.

History and ethics. A course of lectures is given in the senior year by Dr. Hoff on general subjects which cannot well be incorporated in any course of the curriculum; also a course on dental history, taken largely from Professor Guerini's History, and Koch's and Thorpe's histories supplemented by the instructor's personal acquaintance with dental practitioners whom he has known, and who have stood for substantial principles in the upbuilding of the profession. This gives opportunity to introduce instruction on professional conduct and to give concrete illustrations, as it were. This is followed by several lectures on the literature of the profession, giving here also opportunities for calling attention to the value of participation in literary work, and how to cultivate a taste and capacity for such work. Here is also discussed the dental society, its work and value to the profession and the individual. Two or three lectures on professional ethics and jurisprudence are also given. Four or five lectures on practice building and business details and methods of conducting a practice complete the course. This course takes up from twenty-five to thirty hours. It has proved a very interesting study for the instructor, and has been received by the students with keen interest and, we hope, to their advantage.

CONCLUSION.

This constitutes our course of instruction, and we trust the detail has not been so tiresome that you may not feel disposed to discuss and criticize any feature of it that does not meet your approval, as we are aware that it is not perfect. As you will observe, we are occupying all our available time, and feel that any further additions to the curriculum cannot be made except additional time be provided in some way. Shall we increase our entrance requirements, and so get better prepared students who will have had some of the fundamental sciences in their academic courses and be prepared to do the work in a shorter time, or shall we add another year to our course and more studies to the curriculum? You will note that we repeat none of our courses, and we have concentrated our efforts wherever it seems practicable. With the science subjects broadening every year and with the tremendous advancement of the last fifteen or twenty years in technical knowledge, it does seem that the time is not far distant when we shall be compelled to condense or crystallize our work into the "active principle" form, or extend materially the time for its presentation.

After the reading of Dr. Hoff's paper the methods of teaching the different branches were discussed by the members present.

Dr. OWRE moved, and Dr. Kirk seconded, that the next meeting of the association be held in Boston, the time to be agreed upon later by the Executive Committee. (Motion carried.)

There being no further business before the association, Dr. Smith, the president, declared the meeting adjourned until the next annual meeting.

DENTAL SOCIETY OF THE STATE OF NEW YORK.

Forty-fourth Annual Meeting.

(Continued from page 930.)

FIRST DAY—*Evening Session.*

THE meeting was called to order at 8 P.M., Thursday, May 9, 1912, by the president, Dr. Ellison Hillyer.

The first order of business as announced by the President was the reading of the Report of the Correspondent, Dr. E. B. PRENTISS, New York, which was entitled "Effects upon the Teeth of the Administration of Iron, Acids, etc., and the Precautions Taken by Physicians to Avoid Injury to the Enamel."

[This paper is printed in full at page 1002 of the present issue of the COSMOS.]

Discussion.

Dr. L. M. WAUGH, Buffalo. The subject before us seems worthy of the time and best thought of this society. The conclusions to be deducted are based on the observation of practical results obtained by men eminent both as teachers and practitioners. Data thus obtained must be of positive aid in crystallizing the thought and determining the practice of the profession.

It is a matter of regret that the answers from even these eminent men prove that physicians, as a class, give little special attention to the condition of the teeth, as about 38 per cent. state in their answers that they have observed no injurious effect upon the teeth following the continued administration of the acid preparations of iron. When one realizes that the vomitus of seasickness and pregnancy is sufficiently acid in many cases to decalcify and roughen the enamel, it is surely within comprehension that acid medicines, unless much diluted, could have a similar action. In dentistry clinical observation compels a recognition of the resulting harm. This is due to decalcification of the surface of the enamel as the result of the mineral acid entering into the medicinal preparation. This roughens the tooth-surface and invites the collection of food débris and the formation of bacterial plaques, the further decalcification and liquefaction of the hard tooth-structures being continued after the process described by Miller.

While it has been our view that only the acid preparations of iron are distinctly harmful, it has been a question of increasing interest whether discolorations of the tooth-surfaces are not induced also by other forms of iron medicines. No harm to the underlying tooth-structure could be observed.

We have always felt that when an acid preparation had been conveyed through the mouth without coming into contact with the teeth, there could be no further possibility of decalcification or other harmful action. The question raised by Dr. Truman, however, of the possibility of chemic change of the acid preparations of iron after entering the stomach, opens a field for study. If acid exudations may thus be induced in the oral cavity and cause injury to the teeth, then we must urge the frequent and systematic use of antacid mouth-washes during the period of administration, even though the iron preparation is taken in capsules. This question, it would seem, is worthy the serious consideration of the profession.

We have derived much benefit from studying the report, which, for our practice, has led to the following conclusions:

(1) That acid preparations of iron may be largely dispensed with.

(2) That when acid preparations are considered essential, they may and should be administered in capsules.

(3) That the use of iron preparations in pill or tablet form, in so far as practicable, should be urged.

(4) That until the question of possible injury to tooth-structure by the acid preparations, even when administered in capsules, shall have been decided in the negative, the dental profession urge the frequent use of antacid mouth-washes.

Dr. W. D. Tracy, New York city. I have perused a copy of the Correspondent's Report as submitted by Dr. Prentiss, and consider it a valuable record of the opinions of men prominent in medicine and dentistry upon a subject of much interest.

The conflict of opinion among men of such high standing is rather disconcerting to the practitioner who hopes to learn wisdom through the experiences of others. For, when the leading lights in the medical fraternity entertain opinions that differ so widely, and as long as such a marked conflict of theory exists between prominent dentists and their medical brothers, the student is somewhat at sea.

Definite information concerning the preparation of iron most commonly prescribed has been obtained, and the majority of the authorities consulted admit that the tincture of ferric chlorid does seem to be more deleterious to tooth-structure than are the other forms of iron commonly used. In considering practical methods of administering iron preparations, the report states that four men suggested hypodermic injection, but it would seem to me that frequent doses administered in that manner would certainly be a hardship to the patient.

Before receiving Dr. Prentiss' report, I asked one or two physicians why the tincture of ferric chlorid was not administered in capsules, and they stated that alcoholic solutions could not be used in that manner. But as the tincture seems to be the most popular form among physicians, the method of administration as suggested by Dr. Frank Billings of Chicago appears to be the most practical. If the patient is supplied with the tincture in a bottle, together with empty capsules and a dropper, the necessary number of drops may be placed in a capsule, to be closed and taken at once. This may be done as often as is necessary, without ever having the tincture as such come in contact with the tooth-surfaces. If it is a proved fact that the preparations under consideration act directly upon the teeth at the time of administration, then no practitioner of medicine or dentistry ought to prescribe them except in capsules, pills, or tablets.

At a dental dinner recently held in Brooklyn, Dr. Hanning passed a straw to each man present, and asked him to take three or four swallows of water through the straw, and see if he could do so without having the fluid come in contact with his teeth. After a trial all agreed that the protection gained for the teeth in the administration of acid medicines through a straw or tube was a great deal more theoretical than practical. Personally I have never seen, or at least never recognized as such, a case in which the teeth have been locally injured through the administration of any special drug or medicine, excepting numerous cases of discoloration.

Now and then a fond mother explains that the teeth of her daughter or her son have been made defective by medicines administered during an illness, but my subsequent observation and study of the mouth have led me to believe that the conditions found were due to two factors: First, to the perverted oral secretions, and second, to personal neglect. The interesting cases mentioned by Dr. Darby and Dr. Truman are convincing, however, and serve to emphasize the need for caution in the administration of any acid preparation. The conclusions reached by your Correspondent and the recommendations which he makes are certainly most rational, and I am sure we all hope for a mutual understanding and co-operation with the medical profession in the study of problems of this sort. I trust that this report may be printed in full in the important medical publications, as it would call attention to a subject which seems to have received too little attention.

Dr. A. B. COOKE, Syracuse. The report to which you have listened has been so thoroughly prepared and discussed that there is little for me to add. I have been interested in observing the condition of my patients' teeth for many years, and it has often been brought to my attention that the teeth of patients who have suffered a long illness were seriously affected by decalcification. In many of these cases I have questioned whether the medicines given during the illness were the cause of these dental disorders, or whether the general systemic conditions caused by the illness were responsible therefor. It seems to me that the effect of a weak solution of tincture of chlorid of iron, considering the very brief time that it is retained in the mouth, would be infinitesimal, and that there should be very little action on the enamel.

In studying this subject I was sufficiently interested to take two bicuspids which were practically the same and test the resistance of their enamel to acids. I immersed one of these teeth in a full-strength solution of chlorid of iron, and the other in a solution of two grams in one ounce. After a period of twenty-four hours the teeth were removed from the solution and examined. The enamel on the tooth which had been immersed in the full-strength solution was soft, and had been decalcified to the extent of about one-third of the thickness of the enamel. The solution in the bottle was clear. The enamel was soft and could be easily scraped away. In the two grams to one ounce solution, the enamel was softened to a greater depth, probably one-half of it being destroyed; it was, moreover, dissolved, making the solution cloudy. This showed that weak solutions have a greater effect on tooth tissue than full-strength solutions, as was mentioned in one of the letters contained in the report. How far this would apply to high dilutions or dilutions ordinarily taken into the mouth I am not prepared to say, but in my opinion the fact that calcium salts are more soluble in water than in the acid tincture accounts for that. As to the administration of iron preparations and their local effects, I have been inclined to the opinion that it is preferable to use as strong a solution as the patient can comfortably swallow, throwing it well back in the mouth, and immediately rinsing the mouth with an alkaline wash. A small quantity can quickly be swallowed by the patient. The drug comes in contact with only the palatal and lingual surfaces of the teeth, and can be readily neutralized by rinsing the mouth with an alkaline wash.

Dr. E. T. DARBY, Philadelphia. I do not think that I can add anything of interest to what has already been said. My knowledge of the subject is more clinical than scientific. When Dr. Prentiss sent me a list of the questions to be answered, I replied that I had long been of the opinion that acid preparations of iron were destructive to the teeth in the sense that they decalcified the calcium salts of the teeth. I mentioned one remarkable case that I saw thirty or more years ago, in which a woman of about twenty years of age had lost her teeth as the result of taking for a year or more a strong solution of iron. I do not remember whether it was the muriate or some other preparation of iron that she had taken, but her teeth showed precisely the same effects that would be produced in the laboratory by mineral acids. The decalcification of the enamel was so extensive that it was impossible to save the crowns of the teeth. I questioned her at that time as to the nature of her illness and the character of the medicines she was taking. She told me that her physician had kept her on an acid solution for a period of a year or more, and had given no instructions about taking the iron through a tube, or about rinsing her mouth afterward with an alkaline solution. There was no doubt in my mind that the condition of her teeth had been brought about almost wholly by the strong acid solution which she had been taking.

In regard to the effect of iron taken in other forms, I have been of the opinion that iron as iron has no effect upon the teeth whatever. I think whatever deleterious effect it has is through its combination with acids.

I have no doubt that some of you have seen the result of the so-called grape cure, as practiced in Switzerland. Some years ago I had a patient who spent two years in Switzerland taking this cure. She was in the habit of taking the seed out of the grape by pressing the pulp between the lips and the teeth. The acid lying between the pulp and the seed had decalcified the labial surfaces of the teeth of this patient to such an extent that in one or two instances the pulps were nearly or entirely exposed. It became necessary to cut off the incisors and engraft crowns upon the root. This phenomenon is not ordinary caries, but the caries as produced in the laboratory. In my opinion the secret of the action of iron upon the teeth is the decalcification which the acid produces.

Dr. **Edward C. Kirk**, Philadelphia. When the Correspondent wrote me asking for some expression of opinion on the action of iron salts taken as a medicine upon the teeth, I replied that I had thought the last word had been said upon that subject in the report of the research made a number of years ago by Dr. Weld—that the matter had been gone over very exhaustively and very thoroughly at that time; but with a view to rehearsing some of the ground, I immediately took about half-a-dozen sound teeth and placed them in solutions consisting of varying dilutions of officinal tincture of chlorid of iron. They were left in these solutions for from ten days to two weeks. I examined them this morning before I took the train, and I found that all of the specimens had undergone more or less disintegration, and what interested me in this process of disintegration was that the mild, dilute solutions of the tincture seemed to be most active in their solvent power. That is to say, teeth placed in the dilute solutions were not only decalcified, but even the organic matrix seemed to be destroyed, so that nothing was left but a gelatinous mass; whereas in the more concentrated solutions, while the teeth were more or less decalcified, there were some lime salts still left in the bottom of the bottle.

There can be no doubt about the destructive action of the tincture of chlorid of iron upon the enamel of the teeth, but I want to call your attention to one of those attitudes of mind toward this question which grows out of a misconception. Nothing but acid salts of iron can have this effect, and when we think of the tincture of chlorid of iron, simply because the name is pretty long we have progressively abbreviated it to tincture of iron, and then when it was in common use physicians would often simply say that we would have to take "iron," meaning tincture of chlorid of iron—hence the corrosive action of this compound was popularly attributed to all iron medicament. I want to lay down the principle that iron as such has no corrosive action on the teeth. It is not the iron but the hydrochloric acid in the tinct. ferri chloridi that is responsible for the corrosive action of that compound. Iron as such has no effect on the teeth excepting possibly to produce discoloration. The whole subject, it seems to me, has been so thoroughly worked out and definitely settled in Dr. Weld's paper, which is a matter of historical record, that personally I have regarded the subject as a closed issue. But I do want to call attention to the error in our attitude of mind in saying that iron affects the teeth. It does not; it is the acid in iron combinations that is responsible for the destructive acids, and not the iron itself.

Dr. F. W. Low, Buffalo. Ovoferrin, the preparation of iron with which I have experimented on myself, and which is, I think, the chlorid tincture, contains no acid according to the manufacturers' claims. Any iron preparation will completely deprive the saliva of all potassium sulfocyanate, and in this, in my opinion, consists the only deleterious effect of iron. Even if it is taken through a glass tube, we still find these conditions, the teeth being more susceptible to caries. I believe that when iron is taken, as soon as the period of medication ceases, the patient should be given potassium sulfocyanate to restore the saliva to its normal constituency.

Dr. W. B. Dunning, New York city. I should like to relate an instance from my practice which has a bearing on the subject under discussion. A physician sent a patient to me who was taking hydrochloric acid for acute indigestion, and he suspected that some free solution of the enamel was going on. The patient presented a very interesting condition. The line of the lower incisors dipped in a semilunar curve, and the line of the upper incisors had the same semilunar curve inverted, so that when the teeth were brought together, there was a round hole, a little larger than a lead pencil, as clearly defined as though it had been made with a conductor's ticket-punch. The patient told me that she had noticed the opening only within a few months. The lingual surfaces were flattened and the natural ridges were obliterated. I asked her what method she employed in taking this dilute acid, and she told me that she was depending upon a tube. From the description of the way in which the tube was used, I came to the conclusion that the regurgitation of the acid in the act of swallowing had carried the acid against the lingual surfaces of the incisors, and each time a certain amount would come between the tube and the incisors, and the teeth were damaged in this way. In the course of eight months, considerable destruction had occurred, and the deformity is now very marked. It seems to me that in such cases the acid is decidedly detrimental.

Dr. Low. I should like to ask if the condition of the teeth in Dr. Dunning's case did not resemble chemical erosion or abrasion, more than ordinary caries?

Dr. Dunning. Yes.

Dr. Low. I have had patients manifest that extreme condition, and I believe it was more in the nature of erosion or abrasion than ordinary caries.

Dr. Prentiss (closing the discussion). I have been very much gratified by the discussion, from which I conclude that the main items to be considered by us are, first, that the majority of medical men still prescribe the tincture of chlorid of iron more than any other preparation, fully two-thirds or three-fourths of the answers received stating that.

In regard to the precautions taken, by far the majority of practitioners depend upon the glass tube and dilution. Several *confrères* seem to have made experiments recently corroborating those of Dr. Weld, as set forth in his paper of 1886, showing that the tincture of chlorid upon dilution with water liberates free hydrochloric acid and has a greater decalcifying effect than the full-strength solution.

The glass tube, in my opinion, cannot be of any use whatever; it is upon the matter of taking precautions, therefore, that the greatest stress should be laid. No acid preparation of iron should be given without definite instructions in regard to thorough rinsing of the mouth with an alkali, sodium bicarbonate or the like, and thorough brushing of the teeth, preferably brushing first and then rinsing with an alkaline wash. Dr. Billings' suggestion, that the tincture of chlorid of iron be given in capsules should be generally followed. One or two physicians have told me that the solution will dissolve the capsule, yet Dr. Billings seems to have been successful in administering iron in that way.

(To be continued.)

SUSQUEHANNA DENTAL ASSOCIATION OF PENNSYLVANIA.

Forty-ninth Annual Meeting, held at Wilkes-Barre, Pa., May 21, 22, and 23, 1912.

The forty-ninth annual meeting of the Susquehanna Dental Association was held in Irem Temple, Wilkes-Barre, Pa., May 21 to 23, 1912.

The meeting was called to order on Tuesday morning, May 21st, at 10 o'clock, by the president, Dr. F. L. Davenport, Wilkes-Barre.

The Rev. Dr. R. T. Roberts, Wilkes-Barre, invoked divine blessings on the deliberations of the association.

Hon. R. M. Flaherty, Wilkes-Barre, welcomed the association to Wilkes-Barre on behalf of the city.

Dr. W. A. Spencer, Carbondale, responded to the address of welcome on behalf of the association.

Rev. Dr. Roberts also welcomed the society to the city of Wilkes-Barre.

The secretary, Dr. Donnegan, read the resignations of Dr. M. C. Barner, Jersey Shore, and Dr. H. D. Matten, Wilkes-Barre.

Dr. Donnegan also presented communications to the society in reference to the National Dental Association Clinic and the Chapin A. Harris Memorial Fund.

Dr. THOMAS moved that the two resignations presented be accepted by the association. (Motion carried.)

Dr. C. S. Van Horn, vice-president, took the chair, while the president, Dr. F. L. DAVENPORT, Wilkes-Barre, read his annual address, as follows:

PRESIDENT'S ADDRESS.

Once more our big family is assembled to exchange ideas and best wishes. Individually, and as a body, I am proud to say, this association ranks with the best of its kind. I cannot help but feel that this will be a great meeting. From year to year each session has improved, and judging from past experience and the work your committee has done, this should be the banner year.

ORAL HYGIENE AND PUBLIC DENTAL EDUCATION.

At this time oral hygiene and public dental education has the floor, and justly so. The "Rip Van Winkle" methods of dentistry are being buried, and we are to enter a new era. We have been perfectly willing that the legislature should vote money to fight glanders for the horse's welfare, likewise vote money to fight hog-cholera and many other diseases of animals and vegetation, but at the same time little heed has been paid to the human race outside of what we could, as dentists, do for the dollar. The number of carious teeth in each child's mouth and the accompanying filth, germs, and disease is beginning to be an old story, yet we have done comparatively little or nothing to eliminate these conditions. To be sure, we shall have to use these facts many many times, but from now on we must not only discuss these things, but we must start in earnest to eradicate the trouble and educate the public. The Executive Committee has started a crusade which should receive the moral and financial support of this body, and before many years the results will be evident, and there will be proper legislation to take care of this work. Oral hygiene is slow in its progress, but, like all educational movements, it is bound to succeed and will be productive of great good. Those who are skeptical need only to read the magazines for proof of its growth; take any magazine published today and compare it with the magazines of five years ago, and you will be surprised to see the increase in space taken up by oral hygiene. The public is becoming intensely interested in this subject; if you are not at present interested, it will be a wise move to become thoroughly acquainted with some of these facts. The public will want an explanation from you.

Recently, under the supervision of the Luzerne and Lackawanna Dental Society, I had occasion to examine the mouths of thirty-one school children between the ages of six and ten years. From numerous articles which I had read, wherein the condition of the mouths of our school children was set forth, I expected to find filthy, neglected mouths, but never dreamed of such utter disregard as exists in our own city. And this condition exists, among the poor, in every other city that does not have any free dental dispensaries. Not a single child was free from caries, not a single child had ever had dental care other than extraction, and not one clean mouth was found. With a very few exceptions, the standing of a pupil in his or her grade could be rather closely determined by the condition of the mouth and teeth.

Why not build up the body of the child, and give its brain a chance to grow? Give the child a chance in the world to be somebody! You would not expect a man with a wooden leg to run a good race, neither can you expect a child with a weakened body and mind to be a factor in solving the problems of today.

PYORRHEA.

The progress made in the treatment of pyorrhea is commendable. Two factions in the profession are still debating the question as to the cause and proper treatment of this much-named disease; yet, when one thinks of the past methods of treating this trouble, consisting principally in extraction, surely great progress has been made through the present methods of prophylactic treatment, correction of malocclusion, splints, etc.

CASTING AND THE TAGGART-BOYNTON SUIT.

Casting has occupied most of the average practitioner's time. The field of the cast inlay is large, and the work extremely interesting. A few have not availed themselves of the opportunity, and perhaps some of us who have used this method would have had fewer failures in other endeavors; but science, like the world, learns by mistakes and failures, and if everyone waited for perfection, nothing would be perfected.

Dr. Taggart has given us casting, but contrary to the statement made in the editorial of March *Items of Interest*, he has not given us the best technique. This society can feel proud of one of its members, whose name I need not mention, for his scientific work and masterly articles, which, if closely followed, will give the best results.

The moral and social status of the dentist has been steadily improving, our ideals are higher, and our efforts have been put forth with unrelenting zeal. Our professional brother is treating us with due dignity, which fact has been brought about by our accomplishments in the healing art.

Occasionally the clouds are rifted, and we find a hornet's nest stirred up. This is our condition today. I refer to the Taggart-Boynton suit. It seems pathetic that a good man should fall when the opportunity presented itself for him to have his name placed along with those of Miller, Wells, and others who were the untarnished ideals of professional honor, and revered by all civilization. While there is no doubt of the great good Dr. Taggart has done, and while no one will deny him the credit due for his great work, it is sad that he is trying to force taxation upon his brothers, debarring himself from ethical remuneration and great glory and honor.

The present suit in the higher courts should be fought to a finish and settled for all time, and, it is to be hoped, won by the defense. Upon the outcome of this suit depends much of our future happiness and protection from unjust taxes. Should Taggart win his suit, there will be no limit to the number of taxes, licenses, etc., we might become subjected to. Nearly everything in dentistry is patented with both process and appliance patents, from crowns and bridges down to the lining of a cavity with oxyphosphate cement.

I do not wish to throw cold water on the good and great work done by the founders of the National Protective Association, but would ask the members of this association to lend their moral and financial support so that, in turn, the entire profession may receive protection. The National Dental Society should shoulder this work, and appoint its own protective association, with power to act in all litigations.

INSPECTION OF DENTAL OFFICES.

Next to oral hygiene we need office hygiene. A tour of the offices of your own town, if it be of any size, will reveal startling facts. You will find practitioners who use a single mouth-mirror all day long without sterilizing it, even without giving it a good washing. Instruments go from one mouth to another without a bath. Filth can be seen at every turn, a harbor for disease and an ideal means of communicating it. Dr. Bratt, in my opinion, has the right idea. The state should pay for a dental office inspector to be appointed by the state society. His duty should be to examine every office periodically as to cleanliness and proper equipment for the same; he should also see if the law has been carried out. Every illegal practitioner would be discovered and given notice to quit. Then such men could not move from town to town, as they do now, after being driven out by a local society. Considerably less money would be spent—as the prosecution of illegal practitioners requires no small amount at present, the state society and local societies yearly spending large sums, and without satisfaction. Such a practitioner may be closed up in Pittsburgh, move to Philadelphia, and practice there some time before being discovered and prosecuted, or driven out. His prosecution is an endless chain, with no results. An inspector would do the work of all the law committees of the state; we could drop that committee and employ our energy for other purposes.

MEMBERSHIP.

The membership of this association at the close of the last session was one hundred and eighty-eight. With the territory which this society covered originally we should have double that membership if each member brought a new one into the fold. We cannot expect many new members from outside the old territory, and it is a question in my mind whether or not it was a good move to open our membership to the state.

RECIPROCITY.

We need reciprocity in dentistry; a state-board certificate should entitle its holder to practice in any state in the union. There should be either a national examining board appointed by the National Dental Association, or the National Dental Association should prescribe a standard of preliminary education which would invite reciprocity with all states.

THE NATIONAL DENTAL ASSOCIATION.

The National Dental Association should revise its by-laws so as to take in all state societies, every society to be a component part of the National. When this has been accomplished, the National should be strong and rich enough to publish a magazine—a consummation devoutly to be desired.

DR. F. L. HOLLISTER'S DEMISE.

In February of this year occurred the death of Dr. F. L. Hollister, a pioneer of this association. He saw many changes from the time when dentistry was a trade until it became a great profession. Dr. Hollister attended all the meetings of this association, when his health permitted, and took an active part. He was first to hold out a helping hand, to encourage and instruct those in need of help; he was self-sacrificing to his own detriment. This association has lost one of God's men, whose place it will be difficult to fill. Dr. Hollister's influence will be felt for the lifetime of all those whose good fortune it was to come in contact with him.

FIFTIETH ANNIVERSARY OF THE ASSOCIATION.

Next year will be the semi-centennial of this association, and it is my wish that we fittingly commemorate that event. While the meetings of this association for several years past have reached a high standard and have progressed rapidly, we can and should make a great effort to have our fiftieth anniversary go down in history as one long to be remembered.

I cannot close without thanking the members of the Executive Committee for their faithful and conscientious work in preparing for this meeting.

Dr. DONNEGAN moved that the President's address be referred to a committee of three, to be reported on at a later session.

Dr. Van Horn appointed as such committee Dr. T. W. Thomas, Dr. S. B. Spencer, and Dr. L. J. Wasley.

Dr. DONNEGAN moved that a committee be appointed to draft resolutions on the death of Dr. F. L. Hollister, Wilkes-Barre.

The motion was carried, and the President asked the privilege of appointing this committee later.

Dr. DONNEGAN moved that the DENTAL COSMOS be made the official organ for the publication of the proceedings of the association.

There being none of the members of the Board of Censors present, Dr. VAN HORN moved that the rules be suspended, and that a temporary Board of Censors be appointed by the president.

The motion was carried, and the President appointed the following as temporary Board of Censors: Dr. L. J. Wasley, Dr. H. G. Pettebone, and Dr. D. S. Gardner.

Motion was then made and carried to adjourn until the afternoon session.

TUESDAY—*Afternoon Session.*

The meeting was called to order on Tuesday afternoon, May 21st, by the president, Dr. Davenport, at 2.30 o'clock.

The first order of business was the report of the Board of Censors.

The Board of Censors reported the applications of five new members to the society. Motion was made and carried that the five applicants be elected to membership. (Motion carried.)

The next order on the program was the reading of a paper by Dr. C. S. VAN HORN, Bloomsburg, Pa., entitled "The Wax Pattern: A Technique, Together with Appliances, etc., for Its Execution."

[This paper is printed in full at page 973 of the present issue of the COSMOS.]

Discussion.

Dr. J. G. LANE, Philadelphia. We all owe Dr. Van Horn a debt of gratitude, to say the least, for the amount of energy, time, and skill that he has devoted to developing and perfecting the details of the casting method. The casting method, as you all know, was given to us in a more or less crude form; it remained for somebody to put it into reliable shape, and I do not know of anyone who has done more in this direction than Dr. Van

Horn. He has worked with his characteristic untiring zeal and energy in his efforts to standardize the casting process.

There is no denying the fact that inlaying with gold and casting has become an adopted standard operation. It is most peculiar that the cases which are the most difficult to fill with gold or any other material are those in which the best comparative results can be obtained with the gold inlay. The class of cavities in which it is most difficult to adopt the gold inlay is the one in which Dr. Van Horn has done the most and best work in his efforts at standardization.

He refers in his paper to the possibility of injury to the peridental membrane, the enamel, and the gum tissue through the malleting of gold. It is a fact which we must not overlook that the peridental membrane, if once injured, will be always injured. This should be borne in mind at all times, and particularly in this connection as being an argument in favor of the inlay as over against the gold filling.

The essayist refers to various statements that were made when the casting process first came into use, viz, that anyone who could fill a cavity with wax and fuse gold could make a cast inlay. This was for a long time thought to be the case, but our experience in this work has proved it to be incorrect. There are many factors involved, many details to be considered, and conditions to be observed, which Dr. Van Horn has called to our attention this afternoon. We know now that the mere ability to fuse gold and fill a cavity with wax is not sufficient for doing a successful inlay operation.

The "liquid wax" technique which Dr. Van Horn has described is new and unique, and I have not had the opportunity of trying it. I have, however, experienced some difficulty occasionally in forming wax patterns, finding that they did not reach the cervical margin of deep cavities. It never occurred to me to overcome this difficulty by using liquid wax as suggested. I have, for the same purpose, employed another method, viz, instead of painting liquid wax on the partly formed pattern, I have added a little bit of softer wax to the imperfect portion, reinserting the pattern into the cavity and shaping it up.

Dr. Van Horn referred to the literary turmoil that has arisen over the double compound cavity. This originally literary turmoil extends now over the whole process, because this form of cavity is not easily fitted, and has been very annoying to the operator and in a great many instances the cause of disappointment. Let us consider that type of cavity for a moment. Grant that we have an accurately fitting inlay, and cement it in place in a cavity. We must agree that there is cement under the inlay, and that cement occupies space. You can prove this to your own satisfaction by cementing the most accurately fitting inlay and removing it—cement will be present. This would seem to indicate that in order to go to place and allow for that infinitesimally thin layer of cement, an inlay would have to be smaller than the original wax pattern. In a cavity of the type referred to, this discrepancy necessary for the cement space would need to be a plus condition mesio-distally, and a minus condition bucco-lingually. How does Dr. Van Horn arrange for that? If an inlay, set with cement in a double compound cavity, has a zero measurement, this would indicate that the bucco-lingual measurement of the inlay should be smaller than the cavity, and the mesio-distal measurement larger than the cavity. I would like to ask Dr. Van Horn to explain in his closing remarks just what technique he uses in his wax-pattern method for correcting that?

I should also like to have him tell us what is the real purpose of coating the entire cavity surface of the wax pattern instead of the part that may be imperfect or need to be extended?

He does not advise the use of cold water on the pattern while it is in the tooth, yet in another part of the paper he says that he uses cold running water to clean his pattern. I would like to ask him why we should not use cold water on the pattern in the mouth?

In one of the specimens that were

passed around for inspection, the inlay has been burnished. The essayist referred to the fact that the pattern, or rather the inlay, originally stood out a little beyond the cavity. Why did it stand out beyond the cavity?

I was disappointed with two or three remarks in the closing paragraph of the essayist's paper. One of these was that this is the last instalment, by which we assume that the essayist considers his work complete. If I correctly interpret the whole question, the possibility of making a gold inlay that absolutely represents a predetermined size is pretty nearly as vague as it was before he gave us this technique. There are several more phases that will have to be standardized very materially, before we shall realize the perfect result which the essayist claims.

I should like to recall some of the points Dr. Van Horn has brought out in one of his previous papers on this subject. In a paper read about two years ago before this society, he says that—"It is absolutely impossible to obtain two inlays of the same size, unless the two patterns are flasked at exactly the same temperature," and we might add with equal propriety, that these two patterns have to be invested, of course, in the same investing material. I have here a copy of the *Dental Digest* for February of last year, containing a record of various investments for casting molds. In this article the relative possibilities of the various kinds of investments are stated, and the shrinkage or loss in the size of castings made in these investments is shown. All these castings were made in hot flasks. The difference in size is remarkable. One more step toward standardization, therefore, by compounding an absolutely standard investment, is yet to be made by the essayist.

In the same article figures are given regarding the same investments, patterns of the same size, etc., all conditions being the same except that the casting was done in a cold mold. The notable feature of this experiment is that in each case there is an additional loss of approximately one-half of one per cent. in the size of the castings. These figures will have to be regarded as correct until disproved.

Dr. Van Horn says that—"It makes no difference at what temperature the casting is made, whether in a hot or cold mold." We know, however, that we can produce various sizes of inlays by casting at various temperatures, all other factors being equal. Therefore, unless the essayist works out some kind of technique for keeping the flask at a uniform temperature while casting, that one operation will still be done by guesswork, and the standardization of the casting process as a whole is a failure.

Dr. H. C. **Middaugh**, Easton, Pa. The subject of inlays has been most interesting to me, and I must say that this interest has not been an entirely unselfish one. Long ago I realized that the gold inlay did away with much of the hardest work in dentistry, and several years before the cast gold inlay made its appearance I was a confirmed inlay worker. In 1900 I read a paper before this society, advocating the use of the inlay in its various forms, and in 1903 I gave a clinic, demonstrating the method I was using, and exhibiting a few patients wearing inlays that had been inserted two years previously.

I had adopted at that time Dr. Ames' method of burnishing a thin gold matrix into the cavity, and building up with lower-karat gold and solder. In large compound cavities I encountered the same problem that confronted us previous to Dr. Van Horn's experiments, viz, that of shrinkage. I tried to solve this problem by fitting a piece of iridio-platinum wire into the matrix so that the ends touched the buccal and lingual walls, then fusing the gold over and around this, and building up to the desired contour. This method, crude as it seems today, was remarkably successful.

It is a noteworthy fact that I have never found caries around one of these inlays. Whether or not in some of these teeth caries occurred, and other practitioners removed or repaired these carious portions, I do not know, but those inlays that I am privileged to see occasionally are still in good condition.

The subject of special cavity preparation for gold inlays was at that time in embryo, and I had to reset an inlay occasionally. I fear that you will say that this savors of empiricism, and is not relevant to the scientific subject under consideration, but the point I wish to bring out by reciting my experience of twelve years ago is this: If these fillings lasted so long, Dr. Van Horn's perfect margins truly should give us what we have been longing for, *i.e.* the permanent filling.

I usually agree with Dr. Van Horn, but I wish to take exception to his assumption that the standard of efficiency is represented by the foil filling. It is my belief that in all cases coming under the classification of very large, large, and medium-sized cavities, the gold inlay is the ideal conservative medium.

Another matter in which I differ with him is the cause of nodules in gold inlays. His statement that the air is being trapped at the time of painting the model is misleading, in my opinion, because some operators are in the habit of using crucible-formers, and in that case usually the crucible is set on a tray, the ring placed over that, and the investment material poured from the top. Of course, the investment material in being poured down tends to involve air, and nodules are liable to be formed on the surface of the inlay.

In closing, I want to go on record as being of the opinion that Dr. Van Horn's work on the subject of gold inlays is second in value only to that of the man who adapted the disappearing model to the use of our profession, viz, Dr. Taggart, and I hope that some day I may be able to add a book to my library the subject of which will be "Gold Inlays," by C. S. Van Horn, D.D.S.

Dr. B. A. COURTRIGHT, Wilkes-Barre. I wish to thank Dr. Van Horn for this and the other papers of his series, and for the accurate work he has done in the field of gold-inlay casting.

There are one or two points in the paper that I should like to have Dr. Van Horn elucidate for us in closing the discussion. One is the double compound cavity in the molar that he passed around, in regard to which he stated that all cavities should be so formed in making the wax pattern that the wax will be condensed in every direction. In this double compound cavity he makes what he calls a wax tray, forces the wax into the cavity, and makes it fit the cavity in every direction. He carves off the surplus, removes the wax tray, and then goes over the surface of that wax tray with liquid wax. If that wax tray fits the cavity mesio-distally, and he coats the cavity surface with liquid wax, in again forcing the wax tray home, does he not stretch the bridge of wax between the mesial and the distal parts of the tray, that is to say, mesio-distally?

The essayist also states that, in making the wax tray for that compound cavity, he uses a mass of wax. Some parts of that complicated cavity will be probably one-sixteenth of an inch deep, other parts probably one-thirty-second of an inch, and still others one-eighth of an inch. The essayist forces that wax down into the cavity to make it reach all surfaces as well as the bottom of the cavity. The wax being originally of a certain size, it will, in the shallow part of the cavity, which is perhaps one-thirty-second of an inch deep, be compressed twice as much as in the deeper portion, which is perhaps one-sixteenth of an inch deep. In investing that pattern, Dr. Price shows us that as we compress a given quantity of wax to a certain distance, when we supply heat to it, it will expand almost to its original length. Therefore, if we compress one portion of the pattern twice as much as another portion, would not the expansion be different when heat is applied?

I do not agree with Dr. Middaugh that the gold inlay requires so much less work than the gold filling. Indeed, I find that it demands as much if not more work.

Dr. W. H. HERTZ, Hazelton. I should like to ask Dr. Van Horn what he means by liquid wax? Is it heated wax, or wax dissolved in some way? I should also like to ask how he overcomes the contraction of the gold in making the casting of a Carmichael crown?

Dr. VAN HORN (closing the discussion). Much of Dr. Lane's discussion is undoubtedly pertinent, but in consideration of the fact that this is the third, or possibly the fourth, of the four papers of this series that he has discussed, I am somewhat surprised that he should overlook certain salient points in the papers that have preceded this one.

In mesio-occluso-distal cavities of which he spoke, adding beeswax is more or less suitable in some cases, and was used by the speaker prior to the adoption of the other technique; but the liquid-wax process is decidedly more certain, and, if used as described, will give definite results.

Dr. Lane asks what technique I use in allowing for the cement, for if an inlay fits the cavity as does the wax pattern, there would be no room for the cement. In a previous paper of this series, it was explicitly pointed out that the part of the pattern representing approximately the dentin of the tooth cavity was reduced by scraping or carving to make room for the cement under the casting, and that the casting rests upon or comes in contact with the walls of the cavity to the extent of about one or two millimeters from the margin toward the interior of the cavity. This is a very important part of the technique, and I suspect that Dr. Lane asked that question more in order to have it emphasized than for his own benefit. He has that habit, which in my judgment is a commendable one, and often productive of much good.

The reason why cold water may be used on the pattern when out of the mouth is that the wax is free to contract and expand uniformly, whereas, if it be subjected to cold water while in the tooth cavity, its shrinkage would be interfered with by the floor, step, dovetail, etc., of the cavity, and as a consequence the pattern would in some parts be stretched.

Dr. Lane says that he can make two castings of different size if the patterns are invested at the same temperature. That is true, if he casts one in a cold and the other in a hot mold. The temperature at which the casting is to be done must be determined before investing the pattern, the temperature at which the investing is done to be governed accordingly. In other words, the pattern must be invested at the proper temperature.

Dr. Lane criticizes my technique or my apparatus, or both, on the ground that no provision is made for controlling and recording the temperature of the mold at the moment of casting. This condition we pointed out in a previous paper as being important. I wish to state emphatically that I do not claim absolute perfection either for my technique or my appliance; and, furthermore, I am unable, after much thought and experimenting, to devise an appliance that will control absolutely the temperature of the mold at the moment of casting. It is true, as Dr. Lane says, that, in order to obtain absolutely perfect results, we must know the temperature of the mold at the moment of casting; furthermore, the temperature must be controllable and constant for a given operation. We admit freely that the casting appliance described in this series of papers does not measure up to such an ideal nicety of temperature control at the moment of casting, but, if the operation be carried through in a specified time, we obtain a reasonably uniform temperature at the moment of casting, and the castings will be relatively uniform in size, as we have endeavored to demonstrate by the castings which have been passed around. (See Fig. 12, on page 985.)

The experiments for determining the shrinkage of gold which were read from the *Dental Digest* are of no value whatever, for the reason that neither the temperature of the pattern at the time it was measured nor the temperature at which it was invested was known.

Dr. Middaugh disagrees with me as regards the comparative merits of the gold filling and the gold inlay. If I interpret his remarks correctly, I think he will find, if he studies the paper a little more closely, that our views are practically synonymous. With his ideas on the cause of nodules on the cavity surface of the casting, I am not in accord. His deductions would seem to indicate, first, that air-bubbles are contained in the investment which is poured into the flask; and second, that these air-bubbles which he assumes to be present are more resistant than is the investing material which has been placed upon and surrounds the pattern, and when the coated pattern is settled into the investment in the flask, these air-bubbles, by virtue of some superior power, displace the coating on the pattern and cling to its surface. If Dr. Middaugh will follow closely my technique of pattern-coating and investing, he will have no nodular trouble.

In using liquid wax, the reason for coating the entire cavity surface of the wax tray is to make certain that there is no deficiency at any margin, when the tray is replaced in the cavity. If only the deficient portion of the tray were coated with liquid wax, we should have many cases of marginal defect, due to the tray not going back to its exact original position.

Stretching of the occlusal extension in a mesio-occluso-distal cavity, as pointed out by Dr. Courtright, can occur only through carelessness in technique. If the proper technique be carried out in the proper manner, the making of a pattern for a double compound cavity becomes a relatively simple and a positive procedure.

In using the wax mass, as in the occlusal cavity in the molar in Fig. 4, and stretching that part which goes down so much farther than the other, in the first place some stretching of the wax occurs at those portions, but it is not of such great extent as Dr. Courtright assumes. There is, however, some stretching, and that is why we emphasize in the paper that the wax tray must be reheated, because the tension is relieved thereby, and consequently all the elastic properties that have been produced by stretching the wax are annulled.

In stretching wax when making patterns, there is nothing at all definite or dependable, consequently, whenever such a condition does occur, the tension must be relieved. It seems to me that pattern-making is a scientific proposition, and should be conducted scientifically.

Dr. Hertz asked several questions which I did not note, but I remember that he asked one in connection with the so-called Carmichael crown. The question of manipulating the Carmichael crown in casting is simply one of utilizing the expanded pattern technique. It is a difficult task to make a pattern for a Carmichael crown without stretching the wax, unless the wax tray method is employed and the tray is reheated to relieve the tension that has been caused by the stretching.

I wish to thank my *confrères* for the liberal discussion they have accorded my paper, and the members of the association for their kind attention.

The next order of business was the reading of a paper by Dr. G. W. CLAPP, New York, entitled "Getting Down to Brass Tacks on the Subject of Dental Business."

The meeting then adjourned until the evening session, at which an address was delivered by Dr. W. W. BELCHER, Rochester, N. Y., on the "Public Dental Dispensary," and short addresses were made by Mayor Kosek, Wilkes-Barre, Dr. G. W. Guthrie, president of the Wilkes-Barre city school board, and others.

(To be continued.)

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PHILADELPHIA, SEPTEMBER 1912.

EDITORIAL DEPARTMENT.

THE TRAINING OF DENTAL INSTRUCTORS.

AT its meeting held in Stockholm the Commission on Education of the International Dental Federation, in the further pursuit of its study of the educational question, among other things took up for consideration the important question of the relative proportion which the didactic instruction ought to bear to the amount of laboratory work in the standard dental curriculum.

The involved problem is of larger importance than might appear from a superficial examination—for no little mental confusion seems to exist with reference to the actual meaning of the terms "didactic instruction" and the laboratory or manual training method of instruction respectively.

If we mean by didactic instruction only such instruction as is presented in a formal lecture, and if we include in our definition of laboratory or technic instruction all of the explanatory teaching that should properly accompany the demonstrative teaching of the laboratory, then for the sake of convenience we may apply the term didactic teaching only to such formal exposition of the underlying scientific principles or historic presentation of the subject-matter of the course as may be given in the usual formal discourse from the lecture platform of the school. Such a division of the teaching work of the curriculum must, however, be purely an arbitrary division, for convenience of description rather than for the practical education of the student; for, in the larger conception of what has been actually designated as the manual training method, the central idea suggested by the phrase "manual training"—that it is a system of hand-training exclusively—has been altogether overshadowed by the recognition of the fact that the manual training idea in its essence is primarily a system of mind-training through the medium of the hand as a perceptive organ, and that in the larger and more general understanding of the principles which it involves, manual training is an objective system of education which utilizes all of the perceptive faculties in the educating of the mind.

In such a view the didactic system and the laboratory or objective system become correlative and interdependent, for while on the one hand no method of laboratory training can be of practical value unless accompanied by intelligent didactic explanation by the instructor in charge, so also didactic instruction by the formal lecture in any department of physical or biological science requires the material aid of objective demonstrations to enhance its teaching value by direct appeal to the other perceptive faculties in addition to that of hearing. Therefore, as we have said, the distinction between didactic instruction and laboratory technic training must remain an arbitrary division, and the principles which apply to education as a whole must be brought to bear in the laboratory as well as upon the lecture platform, for the attainment of the best educational results.

The whole question, then, resolves itself into a study and application of the problem of pedagogy as related to the needs of dental education; and at the basis of pedagogy lies that young but vigorously growing science, psychology.

It may be conceded that there are occasional instances where teachers, like poets, are born, not made; yet on the whole, in view of the problems which the great field of education presents, it is scarcely more hopeful for us to depend for our supply of efficient teachers, in dentistry or in any other department of biological science, upon those occasional, sporadic, special pedagogical creations than it would be for the world to depend upon the same source of supply for its needed quota of skilled chemists, engineers, astronomers, etc. The demand for good teachers so far exceeds the supply of those naturally born to the work, that the supply must be created, and, like any other high efficiency product, must not be created empirically or in a haphazard way, but through skilful and intelligently directed methods of training. Dentistry has thus far depended for its teachers upon a more or less self-selected body of men whose tastes, inclinations, or ambitions have led them to adopt teaching as an avocation—a side issue, as it were, to their vocation as practitioners of dentistry; but a very small proportion of our teachers have elected to devote themselves exclusively to teaching work and have specially prepared themselves for their work by training in the pedagogical principles which are fundamental to all educational methods.

The increasing demand for skilled practitioners of dentistry, arising out of the rapidly growing demand for dental service as a public necessity, is bringing us rapidly to the point where it will be necessary for us as a profession to give more earnest consideration to the thorough training of men for the special life-work of dental teaching, in order that the general level of education of the coming generation of dental practitioners may be brought up to the standard which a reasonable public expectation clearly demands. In order to achieve such an object as is here suggested it will be necessary that the training of dental teachers shall become a part of the recognized business of dental education, either ultimately by the establishment of separate schools of dental pedagogy, or by the inauguration of courses within already established dental schools for the definite purpose of training men in the science and art of dental teaching. The creation of courses in dental pedagogy within already established dental schools and the admission of selected qualified men to such courses would tend not only to focus the attention of existing dental teachers upon the scientific principles which are at the foundation of dental teaching, but would dignify the calling of the dental teacher to a degree that would attract good men to the teaching profession, and above all tend to improve our teaching methods in such a way as to eliminate largely the empirical and haphazard methods now in vogue and put our educational system upon a more rational and scientific basis.

REVIEW OF CURRENT DENTAL LITERATURE.

[*Tijdschrift voor Tandheelkunde,* Utrecht, March 15, 1912.]

A NEW METHOD OF FASTENING CROWNS AND BRIDGES. BY E. ADDINGA.

In abutment teeth the root-canals of which are not parallel, a bridge of two parts is recommended. If, for instance, the first and second upper bicuspids are to be replaced by a bridge anchored on the canine and first molar, the root-canals of which are not parallel to each other, the abutment teeth are prepared in the usual way. The canine is capped and fitted with a pivot as in a pivot tooth, and the first molar is also capped and its lingual canal fitted with a pivot. Both band and pivot of the latter tooth are allowed to protrude over the surface of the root from three to four millimeters. On the mesial side of the band a slot is cut out down to the surface of the root. The caps and pivots are then fastened with cement on the canine and first molar respectively. The pivot of the molar is bent parallel to that of the canine, and a bar is adjusted extending from the canine to the first molar, and fitted through the slot in the molar band to the pivot by an eye in the bar. The parts are assembled with sticky-wax, and the bar is soldered to the cap on the canine. The appliance is tried in the mouth, an impression is taken, the canine crown and the first and second bicuspid bridge teeth are set up and soldered to the bar, and the bridge is fastened with cement to the canine root. A crown is then fitted to the molar band, and cemented to place.

[*Ash's Wiener Vierteljahrs-Fachblatt,* Vienna, May 1912.]

STOMATITIS NICOTIANA. BY DR. R. KLEIN.

This case of stomatitis, due to nicotin intoxication concerned a man of fifty years of age who was suffering with severe odontalgia and insomnia. His teeth were perfect with the exception of two small cavities which could not be held responsible for his condition. The black deposits found upon the teeth showed the patient to be a heavy smoker. The mucous membrane was not loose, spongy, or easily bleeding, as in mercurial stomatitis or scurvy, but exhibited a bluish-red color and swelling, though no looseness; it was painful, and resembled cartilage upon palpation. The necks of the teeth were exposed, while the mucous membrane in the interstitial spaces seemed to be hypertrophied, giving to the palpating finger the impression of a string of pearls. There was little or no inclination to hemorrhage. The lingual surface of the denture exhibited the same symptoms, the gingival tissue having receded pronouncedly in the lower molars, the roots of which were exposed to a great extent. The interdental spaces were filled with a greenish-black viscous mass, which strongly smelled of tobacco. The tongue also appeared livid and was swollen, showing the impression of the lingual surface of each tooth. The mucosa of the oro- and naso-pharynx and of the tonsils appeared rather cyanotic than swollen. Speech was impeded, and the breath smelled strongly of tobacco. The patient gave a history of having indulged very freely in an exceedingly strong kind of pipe-tobacco. Upon therapeutic treatment, the nature of which is not specified by the writer, and abstinence from smoking, the pains ceased, and the inflammatory conditions partly subsided, though no complete cure was obtained owing to the patient's resuming his old habit. Soon afterward he suffered a severe relapse, after having indulged in a specially strong brand of tobacco, exhibiting the same symptoms as before, thus confirming the correctness of the first diagnosis. As the patient indulged very moderately in light alcoholic spirits, a confusion with alcoholic stomatitis, as is noted in chronic form in alcoholics, or in acute form after excessive use of dentifrices, tincture of iodin, etc., was out of the question. In that form of stomatitis the gingival tissue is pale, whitish, anemic, and so closely adheres to the bone as to appear almost transparent.

[*Les Annales Dentaires,* Paris, March 1912.]

BEECH CREASOTE, AND ITS APPLICATION IN DENTAL THERAPEUTICS.

By A. C. Seimbille.

Beechwood creasote is to be distinguished from coaltar creasote, which is the official drug and consists chiefly of phenol. The former was used early in dentistry as an analgesic and caustic, but was later replaced by other agents. Still, its healing and powerful antiseptic qualities, as well as its mummifying and anesthetizing actions, favorably recommend this drug. It may be employed as a disinfectant in carious teeth, in acute pulpitis, in hypersensitivity of the dentin, in pyorrhea alveolaris, in pericementitis, in alveolitis after extractions, etc. The pure undiluted solution is suitable in fistulas, and for anodyne and antiseptic dressings. In combination with zinc oxid, iodoform, or trioxymethylene, it may be applied in paste form as a root-filling and capping for amputated pulps, as well as in caries of the third and fourth degrees. This paste has the advantage of hardening quickly, and of precluding any infection. It is very efficacious in hypersensitive dentin, yet the trioxymethylene (paraformaldehyd), owing to its strongly caustic action on the pulp, must be omitted from the paste. Cotton pellets saturated with creasote have been found most valuable in the treatment of pyorrheal pockets, the flow of pus ceasing after two or three applications, and the teeth becoming firmer. Considering its absolute harmlessness to the hard dental tissues, and its remarkable qualities as an antiseptic, caustic, anesthetic, and hemostatic, Seimbille regards beechwood creasote as a most valuable agent in dental therapeutics.

[*Journal of the American Medical Association,* Chicago, July 13, 1912.]

WANTED: A SENSE OF ASEPSIS. By Dr. John S. Marshall.

The author arraigns the dental profession in a most forceful, though unfortunately not untimely philippic, for its widespread lack of a proper sense of asepsis. If a just opinion, he argues, can be formed from observing the clinical teaching in our dental colleges, the methods employed in the offices of nearly all classes of dental practitioners, and the demonstrations at the clinics of our state and national societies, then we must admit that we fall far short of a proper sense of asepsis.

It would be manifestly unjust to say that dental practitioners as a class are ignorant of the principles that underlie asepsis, but the theoretical teaching received in dental colleges is practically ignored by a very large majority of the students in their clinical work in the infirmaries. This is due in part to the fact that the clinic rooms are poorly equipped with sterilizing apparatus, and that the teachers, demonstrators, and professors who oversee and direct the operations of the students are often exceedingly lax in their own technique, and do not insist on a faithful carrying out of the didactic teaching on this subject. The author expresses himself appalled at the utter disregard of all modern scientific methods of asepsis to be found in many of our dental colleges, in the offices of numerous practitioners, and particularly at the clinics of our state and national societies. As illustrations for his main contentions he cites the small number or total absence of sterilizers in the infirmaries of most dental colleges, where the students content themselves with simply wiping their instruments on a towel—often a soiled one—before passing to the next patient, rather than wait for their turn at the sterilizers. Nerve broaches are used over and over again without being sterilized, so are towels, and the demonstrator's hands are rarely ever washed between examinations of different patients' mouths. But, worst of all, a prominent teacher is cited as passing through the operating room with a mouth-mirror in a waistcoat pocket, examining the work of his students and going from chair to chair without once washing his hands or cleansing the mouth-mirror.

The offices of many dental practitioners are not provided with an appliance for sterilizing instruments. Many operators merely wash their instruments in warm water. In one instance the writer was invited to examine a case, and after carefully washing his hands and sterilizing them with alcohol was offered a soiled towel. The charge—and doubtless a true one—often made by physicians that infectious diseases such as tonsillitis, diphtheria, tuberculosis, and syphilis have been frequently transmitted from one patient to another by unclean and septic dental instruments, is a shame and a reproach to modern dentistry.

In the public clinics given at the meetings of various state societies and of the National Dental Association, the same disregard of aseptic methods may be witnessed. The one thing most prominently and indelibly impressed on the writer's mind at the last meeting of the National Association was the reckless disregard of asepsis in many of the clinics, both by the operator himself and those whom he permitted to inspect the progressive steps of his operation and its completion, with unwashed fingers. Personally he has always declined to operate at one of these public clinics, for the reason that the facilities for aseptic operations were so meager or absolutely wanting that he dared not risk the health or life of the patient, or his own reputation.

In his work as an examiner of dental surgeons for appointment to the United States Army, Marshall has found a lamentable lack of a proper sense of asepsis, and many young men have failed in their practical tests by reason of this fact.

The remedy for these conditions lies with the teachers in our dental schools and with the clinicians at our state and national associations. Though infection does not occur in every case, untold suffering and many deaths have been the result of neglect and ignorance of a proper sense of asepsis.

Much of the trouble experienced by so many dentists in the treatment of septic conditions is the result of an imperfect knowledge of the principles of asepsis and a worse than bad technique. The public generally is also becoming educated, and realizes the dangers from infection at the hand of a careless or ignorant dentist.

There is no longer any excuse for lax methods in asepsis, and the sooner the profession awakens to the fact, the better it will be for the reputation of the profession and the health of the public.

[*Deutsche Monatsschrift fuer Zahnheilkunde*, Berlin, April 1912.]

BLACK DISCOLORATION OF THE TEETH DUE TO POTASSIUM PERMANGANATE. BY DR. PORT, HEIDELBERG.

Port describes the case of a young girl who presented a brilliant blue-black discoloration of the teeth, reminding one of the practice of artificially staining the teeth among the natives of Polynesia. The discoloration extended over the anterior teeth, the bicuspids, and the buccal surfaces of the molars. The gingivæ were red and swollen, and partially denuded of epithelium, the epithelial débris also showing black discoloration. The patient gave a history of having sought medical advice for gingivitis. Potassium permanganate was prescribed, and a nurse applied the drug in substance on a pledget moistened with water. Besides the remarkable discoloration described, and also severe inflammation of the gingivæ, no serious consequences resulted. The teeth were cleaned with a rotary brush and pumice. This case is interesting, inasmuch as the prolonged use of concentrated solutions of potassium permanganate generally produces a brown and not a deep blue-black discoloration.

[*Philosophical Transactions of the Royal Society of London*, Series B, vol. 202.]

ON THE DISTRIBUTION OF THE NERVES OF THE DENTAL PULP. BY J. H. MUMMERY.

By the aid of beautiful photomicrographs, Mummery endeavors to prove, first, that the fine neuro-fibrils of the pulp, after interlacing in a plexus beneath the odontoblasts (the plexus of Raschkow), pass between and around the odontoblast cells and form a narrow plexus at the inner margin of the dentin, which might be termed the marginal plexus; second, that from this marginal plexus the nerve fibers pass into the dentinal tubules, which they traverse in company with the dentinal fibril; third, that these fibrils end in arborizations beneath the enamel and cementum, following the fine terminal branches of the dentinal tubules. As these minute neuro-fibrils pass along the tubules of the dentin in their final ramifications, and these tubules are seen in many cases to cross the dentin-enamel margin and end in the enamel, it is possible that many fine nerve fibers pass a short way into the enamel with them, but the writer has not been able to stain any nerve fibers in the calcified enamel. This would not appear to be any systematic innervation of the enamel, as has been suggested by other writers, but more in the nature of an accidental penetration of the tissue by nerve fibers. If the nerve fibers terminate in the so-called enamel spindles, it is very difficult to understand why these spindles are not more regularly distributed, and why they seem to be entirely absent in the enamel in some teeth. There is no doubt whatever, whether they are spaces filled with air, as some think, or filled with protoplasmic material, that the dentinal tubules can often be traced into them.

The teeth being dermal structures and the enamel being an epithelial tissue, the mode of distribution of the nerves of the dental pulp, as described in this communication, would appear to be quite in harmony with the usual arrangement of the nerve fibers in their distribution to other epithelial tissues, of which Prof. Schaefer in his "Essentials of Histology" says: "When sensory nerve fibers terminate in epithelium, they generally branch once or twice in the subepithelial connective tissue on nearing their termination. The sheaths of the fibers then successively become lost, first the connective tissue or perineural sheath, then the medullary sheath, and lastly the neurolemma, the axis cylinder being alone continued as a bundle of primitive fibers. This branches, and, with the ramifications of the axis cylinders of neighboring nerve fibers, forms a primary plexus. From the primary plexus smaller branches come off, and these form a secondary plexus nearer the surface, generally immediately under the epithelium, if the ending is in a membrane covered by that tissue. Finally, from the secondary plexus, nerve fibers proceed and form terminal ramifications among the tissue cells, the actual ending being in free varicose fibrils. This mode of ending is characteristically seen in the cornea of the eye, but can also be rendered evident in other epithelia."

The writer then describes in detail various methods for the fixation and staining of tooth sections.

[*Journal of the American Medical Association,* Chicago, July 13, 1912.]

THE CARE OF THE MOUTH OF THE SICK. By W. C. Fisher, New York.

The writer deprecates the lack of maintenance of a clean and hygienic condition of the oral cavity in hospitals, claiming that the condition of a patient's mouth should be the meter by which the ability of a nurse is registered. Lack of facilities is no excuse. A tongue-scraper made of ivory or steel, which can be sterilized, together with a cotton swab, would do in severe illness where the vigorous use of a brush would be ill-advised. But it should be emphasized that nothing can take the place of the thorough brushing of the teeth and the massaging effect which it has on the tissues, removing accumulations of mucus and other deposits and restoring the tone of the gingival tissues. The application of a spray is considered essential, by the use of compressed air of between 10 and 12 pounds' pressure, to drive the mouth-wash into every little fold of mucous membrane and into the interdental spaces. To obtain the bedside use of compressed air for this purpose, the writer has suggested mounting on a rubber-tired wheeled platform a two-foot air-tank and an automobile pump, with a from six to eight feet hose attachment for spray bottles. This tank can be filled by some attendant while the whole apparatus is in another room or hall, if there be any objection to the sound of pumping. Enough air can be stored by sixty seconds' pumping to spray the mouth of from ten to fifteen patients.

In very sick children who resist any attempt at mouth hygiene, the author offers a bribe of chewing-gum, thereby gaining two points, viz, the child permits some brushing of the teeth, and by this, together with the cleansing action of the chewing-gum, a rather clean set of teeth is obtained. The gum, after use, is destroyed by burning. Cleansing of the teeth of the sick and the convalescent is specially imperative after every meal.

The writer strongly opposes the use of hydrogen dioxid on swabs when ulcerations of the mucous membranes are noticed, because, first, such medication is unpleasant to most patients and adds to the already unpleasant condition of the mouth, and second, by its effervescence this drug can readily cause an extension of the ulceration. These conditions, if they will not heal under an application of iodin, aconite, and chloroform solution, should be treated with a caustic, touched with silver nitrate, and their growth and sensitiveness thus checked. If any pyorrheal pockets are present which contain pus, the effervescent action of hydrogen dioxid may cause a tearing of tissue and an extension of the pocket. Slight ulcerations can be treated with a solution of boric acid and glycerin.

Where nasal obstructions cause the invalid to breathe constantly through the mouth, the dry condition should be relieved by frequently moistening the mucous membrane with a solution of glycerin and water to which a drop or two of oil of betula may be added. If the patient is conscious, salivary stimulation may be obtained by the use of ordinary ginger ale as a mouth-wash. Illness is probably very often prolonged or convalescence greatly retarded by an unhealthy condition of the oral cavity; the necessity of treatment and care of the oral cavity in the sick and invalid, therefore, need not be further emphasized.

[*Deutsche Monatsschrift fuer Zahnheilkunde*, Berlin, April 1912.]

JUSTIFICATION OF ORTHODONTIA OPERATIONS FROM THE STANDPOINT OF HYGIENE. By W. Zielinsky, Berlin.

Starting from the premise that the dentist should not consent to correct a dental anomaly which produces neither functional disturbances nor marked inharmony of facial appearance, the correction of which would consequently be of very minor usefulness, the writer has compiled a number of axioms governing the cases of dental irregularities in which orthodontic operations are fully justified; as follows:

If the position of the teeth unfavorably influences speech, viz, if the organs concerned in the production of speech—the lips and tongue—tire too quickly owing to their being continually interfered with by malplaced teeth.

In disturbances of respiration caused especially by a narrow arch—in which cases the timely widening of the arch will preclude the necessity of a rhinologic or otologic operation later in life.

If upper prognathism and lower retrusion are so pronounced that closing of the lips is impossible, and the patient is forced to breathe through the mouth.

In cases in which the lower anterior teeth strike the palatal mucous membrane, or those in which, owing to excessively strong edge-to-edge bite or to overbite the soft tissues are irritated or injuried to such a degree as to render incision painful or produce frequent hemorrhage.

If, owing to locked bite of the anterior teeth, rotary motion of the mandible in mastication is rendered impossible, the mandible executing merely a straight up-and-down motion.

If through overbite of the lower teeth over the upper, the mandible has failed to become fixed at a youthful age by the natural articulation, viz, the overlapping of the upper arch, and in consequence the mandible has gradually undergone an excessive growth in length, or owing to too loose articulation "wabbly jaw" has developed, as is often observed in the mentally retarded or in idiots.

In cases of so-called "open bite," which is generally due to a rhachitic deformity of the mandible, the individuals affected appearing to be mechanically retarded in regard to respiration and mastication.

If the arrangement of the deciduous teeth, at the time when the permanent teeth should erupt, exhibits symptoms indicating that there would not be sufficient space for the regular arrangement of the permanent denture. And if through premature extraction of deciduous teeth and crowding of the remaining teeth the eruption of the permanent tooth in its proper place is impeded or prevented.

Zielinsky regards early regulation, if carried out properly, as fully justified from a hygienic point of view, and considers the prophylactic observation and care of the deciduous and erupting teeth as one of the most important features and duties of orthodontia.

[*La Revue de Stomatologie*, Paris, January 1912.]

OBSERVATIONS ON THE TEETH AND JAWS FOUND IN AN OSSUARY OF THE STONE AGE. By Dr. J. Ferrier.

The ossuary in which the writer's observations were made dates back five or six thousand years B.C., and contained about 130 skeletons. In his opinion no differences in the formation of the maxillæ and the teeth were noted as compared with modern skulls. In regard to caries, however, not counting the teeth of the aged, an average of three per cent. of carious teeth was observed, as compared with 33 per cent. of carious teeth in the industrial district of Paris. The deciduous teeth were found in excellent condition. In 5400 teeth examined not one single anomaly in structure or position was observed. In almost all cases the teeth were worn to a remarkable degree.

I

[*International Journal of Surgery*, New York, April 1912.]

AN OPERATION FOR THE CLOSURE OF CLEFT PALATE BY GRADUAL PRESSURE. By Dr. B. F. Shea, Brooklyn, N. Y.

II

[*Therapeutic Gazette*, Detroit, April 15, 1912.]

EIGHTY-ONE CONSECUTIVE CASES OF CLEFT PALATE TREATED BY OPERATION. By Dr. Berry.

I. Shea, after some introductory historical remarks and a brief review of the methods commonly employed for closure of cleft palate, presents a technique of operation which may be used any time during the first year, though preferably during the first six months. In his opinion, it is wise surgery to operate early on suitable cases, for the following reasons: There is less nervous shock; the bones are softer; the muscles of the palate are given an opportunity to develop instead of atrophy; feeding, breathing, and phonation are facilitated; in fact, the general vigor of the patient demands early intervention. The operation on the cleft palate, in his opinion, should be performed before the closure of the hare-lip. Before operating, the patient's general health and local conditions should be noted, and any condition, such as adenoids, that might interfere with the repair, should be corrected.

For a few days prior to operation it is well to cleanse the mouth and nasal fossæ with a mild antiseptic solution.

It is the writer's custom to select a specialist in anesthesia, and when possible have him take charge prior to operation and select the anesthetic and method which, in his judgment, is best suited to the case. A thorough understanding between anesthetist and surgeon facilitates operation.

The patient is anesthetized and placed in the Trendelenburg position. A stout thread is passed through the end of the tongue as a traction suture. A bone needle is threaded with strong silk, the cheek raised, and the needle passed through the superior maxilla from without inward, at a point just under the malar process, and high enough to be above the palate. When the needle appears in the cleft the thread which it carries is picked up with a hemostat or hook and the needle then withdrawn. Through a corresponding part of the opposite bone a loop of thread is passed in the same manner. This second loop of thread is tied to the first and the latter pulled out, carrying with it the former.

We now have a loop of thread passing through both superior maxillary bones above the palate and when necessary through the nasal septum. This thread is for the purpose of drawing the free end of the compression bar through the bones, which we now do. This bar is made of gold and platinum wire of about 18 gage, threaded from both ends toward the center. The length of bar is accommodated to the case.

The bar is held in position while lead gaskets, silver plates and nuts are adjusted, the plates and gaskets being trimmed to fit the convexity of the buccal surfaces of the bones. The nuts are now screwed on the ends of the bar outside the plates with a small wrench until a slight degree of pressure exists. The surplus ends of the bar are snipped off whenever they protrude sufficiently to interfere with the tissues on the inner side of the cheek. If we are afraid of any irritation or laceration from this cause, we may mold gutta-percha over these ends.

The nuts are turned up a little each day or two, so that there will be slight but gradual pressure. In doing so it may be necessary to take up more on one side than on the other, so as to preserve as near as possible the median line.

On the anterior end of the silver plates Dr. Shea solders two small hooks for the purpose of reducing the premaxillary bones when they are involved. This is done by pressing a rubber band through a small ring which has been soldered to a piece of silver suitably formed to fit the convexity of the premaxillary bones, and the free ends of the rubber band are attached or slipped over the hooks on the anterior portion of the buccal silver plates. He depends upon the pressure from the elastic band to gradually reduce the premaxillary bones. It is very often necessary to cut a "V" from the vomer, in order to get the premaxillary bones in position.

This is all that is done at the first operation, and will occupy about one-half hour.

The length of time required to bring the margins of the cleft in close enough apposition for scarifying and suturing will depend upon the age of the child and the amount of resistance offered by the osseous tissue—approximately two weeks.

The nuts used on the compression bar are of gold made with a fair-sized flange for the purpose of pressure distribution. When we have the margins sufficiently close to scarify and suture, the patient is again anesthetized and the closure of the cleft is completed, leaving in position the compression bar to relieve tension until we have union.

Special attention should be given to the nasal fossæ, so that there will be no crowding of parts. This method of gradually closing the cleft palate gives the operator a chance to decide by observation or measurement the amount of nasal stenosis likely to be caused, and if he sees that by complete closure of the cleft he is crowding the nasal fossæ, he may stop at that point and do a Brown, Langenbeck, Lane, or any of the flap operations. It will take at least three operations to complete the treatment by this method.

The compression bar is flexible, and an anesthetic is not required to remove it.

The after-treatment consists in absolute cleanliness of the parts involved, the use of stimulants, if necessary, and feeding with a spoon.

II. Berry's operations involve cases under sixteen years of age; he believes that the best period in most cases is between the ages of one and three years, according to the nature and width of the cleft. In all cases, the operation has been that of Langenbeck, or some slight modification thereof, and the essential feature is not mere paring of the edges and the median suture, but also the formation of a flap of muco-periosteal tissue from the hard palate. In operating upon clefts of the soft palate, Berry has to a certain extent replaced the lateral incisions by the wide tension stitch. Of the importance of detaching the soft palate from the posterior edge of the hard palate in all but the most trivial cases there can be no doubt whatever, if a good result is to be obtained. As to mortality, there was none.

Berry states that of the fifty-nine cases of his series in which the hard palate was involved as well as the soft, union of the soft palate occurred fifty-eight times after operation. The fifty-ninth case was one of complete double cleft of the whole palate, operated on at the fourteenth month; after the second operation union took place. Of the twenty-one cases of cleft limited to the soft palate, complete union after the first operation occurred seventeen times. One case of cleft of the soft palate was a complete failure, although the cleft was extremely narrow. The child was frail, fretful, and delicate. As regards union of the hard palate, in many cases the first operation did not effect complete closure, one or more, usually small, supplementary operations being required. Occasionally a large part of the cleft in the hard palate broke down after the first operation. In some cases of complete cleft, or of very wide cleft involving only three-quarters of the hard palate, he has intentionally left the anterior part of the cleft to be closed by a second operation.

When once the soft palate and posterior part of the hard palate have been well closed, there is generally but little difficulty in closing the anterior part of the hard palate by a subsequent operation, since the separation of the soft tissues from the underlying bone can be effected with more freedom.

As to the effect upon speech, in some cases speech has been so nearly perfect that it is very difficult to detect that there is anything wrong with it at all.

In several cases a very high degree of perfection in speech has been obtained as the result of operation. In most cases a considerable trace of nasal intonation remains, although the patients can pronounce all their consonants normally, and can make themselves well understood. If the speech of all the cases in this series is not as good as the author could have wished, it must be remembered that much of his hospital material has been very unpromising. At least ten of the cases in Berry's series have been the subjects of previous operations by other surgeons, which resulted in much destruction of tissue, and several other cases were imbecile or otherwise the subjects of marked mental deficiency. From such cases it is scarcely reasonable to expect really good speech. An extremely good result was obtained with the oldest patient in Berry's list, a woman with complete cleft of the whole palate, operated on at twenty-six years. Berry states that his best results have naturally been with private patients, for whom lessons in articulation and careful training at the hands of a governess are obtainable. One of the difficulties that we have to contend with in hospital practice is that of obtaining for the patient after he has left the hospital sufficient skilled training in articulation, without which even the most perfectly restored palate will usually not give perfect speech.

The utmost that the surgeon can do is to restore the palate to its normal condition. Careful training in articulation, if obtainable, will do all the rest. But it should be skilled training, such as ordinary school-teachers and the mothers of hospital patients are rarely, if ever, competent to give.

Berry states it as his firm belief that the turnover flap operation, before many years have passed, will be performed solely by those who do not follow up their cases and who consequently do not know what their results really are.

PERISCOPE.

Keeping Spittoons Clean.—In order to preserve the spittoon clean, it is sprinkled every morning with a little copper vitriol.—*Archiv fuer Zahnheilkunde.*

Polishing Amalgam Fillings.—Plaster as it comes from the flask after vulcanizing a plate is an excellent means for polishing amalgam fillings, after they have been gone over with sandpaper disks.—E. BRAHM, *Tandlaegebladet.*

Bleaching Pink Rubber.—In order to bleach pink rubber, the unfinished plate is held under a cheap bi-convex lens. Care must be taken not to set the plate into the exact focus of the lens.—*Archiv fuer Zahnheilkunde.*

Alum for Perspiring Hands.—Operators whose hands perspire easily will find an alum cake, such as barbers sometimes use, very serviceable for rubbing their fingers on, and rendering them dry.—*Le Laboratoire et le Progrès Dentaire.*

Preserving Hypodermic Needles Free from Rust.—Hypodermic needles that have been used are best preserved in pure lysoform, which keeps them sterile and entirely free from rust.—*Schweizerische Vierteljahrsschrift fuer Zahnheilkunde.*

Removing the Odor of Tobacco and Alcohol from the Mouth.—In order to remove the odor of tobacco and alcohol, the mouth is rinsed thoroughly with one part of 3 per cent. hydrogen dioxid and five parts of rose water.—*Archiv fuer Zahnheilkunde.*

Keeping Vulcanizing Flasks Clean.—In order to preserve flasks clean, they are brushed with soap and water immediately after use. This prevents the metal from oxidizing, and preserves the flasks for a long time.—*Archiv fuer Zahnheilkunde.*

How to Make Sticky=wax.—Gum dammar one part, rosin one part, and yellow beeswax four parts are melted in a water-bath, thoroughly mixed, and poured into a mold, for which purpose the cover of a tin box may be used. The wax is then rolled into pencil form with wet fingers.—W. B. TYRRELL, *Odontologist.*

A Useful Temporary Stopping.—A fairly durable and simple temporary filling can be made by selecting a pledget of cotton of a size corresponding to the cavity, saturating it with very thinly mixed cement, and filling the cavity therewith. This method can be successfully employed in cavities in which a temporary gutta-percha filling will not stay.—*Archiv fuer Zahnheilkunde.*

Mouth-wash after Extractions.—Hot salt water, used freely and frequently after an extraction, allays pain, arrests hemorrhage, and hastens the healing process. This mouth-wash is always available, inexpensive, and quite inoffensive.—*Le Laboratorie et le Progrès Dentaire.*

Producing Smooth Surfaces in Vulcanite Plates.—Vulcanite plates come from the vulcanizer with smooth surfaces if the model and all plaster surfaces coming in contact with the rubber are painted with a mixture of one part of water-glass and two parts of alcohol.—*Archiv fuer Zahnheilkunde.*

Removing the Odor of Rectified Alcohol.—In order to remove the sometimes very disagreeable odor of rectified spirits of wine, a little tartaric or oxalic acid is added to it, which prevents the evaporation of the pyridin which is usually employed for rectifying spirits of wine.—*Le Journ. Dentaire Belge.*

Removing Teeth from Old Vulcanite Plates.—A simple method of removing teeth from old vulcanite plates consists in investing the plate with sand in a flask or any iron vessel and setting it into a burning stove. The fumes of the burning rubber will escape through the chimney. The charred rubber can easily be removed from the teeth with a stiff brush.—*Archiv fuer Zahnheilkunde.*

Arresting Hemorrhage after Extractions.—In cases of persistent hemorrhage following the extraction of teeth or roots, where every other measure for stopping the bleeding failed, dressing the wound with a pledget of cotton charged with from two to three centigrams of powdered corrosive sublimate and held in place until the hemorrhage was arrested, has rendered excellent service.—P. SCERVINI, *La Stomatologia.*

Temporary Stopping, Especially for Hypersensitive Cavities.—One of the most useful temporary stoppings, especially in the case of sensitive cavities, is a mixture of Fletcher's artificial dentin with the addition, after a mix has been made, of a drop or two of oil of cloves. When this is well mixed, some shreds of cotton are incorporated, and the stopping is placed in the cavity, mopping off the excess of moisture. Used in this way the dressing will last for many weeks if necessary.—J. J. ARMITAGE, *British Dental Journal.*

How Athletes Lift Heavy Weights with Their Teeth.—The apparatus by the aid of which athletes lift and carry heavy weights, consists of an iron hook with a thick leather attachment, consisting of several layers of leather sewed together and made to conform approximately to the shape of the palate. The muscles of the face and neck really carry the weight, while the mandible simply serves for fixing the apparatus. A great many performers, of course, employ trick appliances by which the muscles of the abdomen and the legs are made to carry part of the weight.—*Revue de Stomatologie.*

Protection of the Patient's Tongue During Dental Operations.—One of the most useful appliances, which should always be ready to hand in a dental surgery, is a Dr. Flagg's tongue-holder. It is simply invaluable for the protection of the patient's tongue while grinding the lingual surfaces of lower teeth in preparation for crowns, etc. When fixing a bridge in the lower jaw, where there is a superfluity of moisture, this appliance becomes of very great service.

A strip of "cottonoid" should be placed on the patient's tongue under the spoon-shaped end of the tongue-holder, and the patient instructed to keep the tongue depressed by maintaining pressure on the handle. A fresh strip of cottonoid is easily substituted should the first become too moist.—J. J. ARMITAGE, *British Dental Journal.*

Japanese Treatment of Syncope.—A method worth noting, which they term Knatzu, is employed by the Japanese, according to the *Scientific American,* in the treatment of severe fainting spells. It consists in striking repeatedly with the closed hand—doubtless the padded external edge of the palm—the most prominent of the vertebræ at the base of the neck, the seventh. Whether the successive shocks produce reflex contraction of the general arterial system and thus cause resumption of the cerebral circulation or not, the fact remains that the normal action of the heart and consciousness are restored. The patient is then seated, and his arms are given a rotary movement which, possibly by causing traction on the deltoid, or reflexly, enhances the circulatory and respiratory activity. He is also required to walk, to increase the circulatory activity in the lower extremities, a precaution which, from the Japanese viewpoint, prevents recurrence of the syncope.—*New York Med. Journal.*

Irrigation Through the Inferior Meatus in Preference to the Alveolus in Chronic Purulent Maxillary Sinusitis.—In the case reported by C. J. Koenig, the patient, a woman of about thirty years of age, had irrigated the maxillary sinus for six months through the alveolus of the extracted tooth which had caused the sinusitis, producing each time a string of fetid pus. Koenig allowed the alveolar fistula to heal up, and made an aperture of about 1 cm. in diameter into the inferior meatus. Upon irrigation, excessively fetid pus came away, yet after fifteen rinsings the fetor disappeared, and the water used for rinsing became gradually clearer, containing but a little mucus that came away in one single mass. The neuralgic pain from which the patient suffered gradually lessened, and after twenty-eight irrigations a complete cure was effected.—*Archives de Stomatologie.*

The Operator's Hands.—Septic infection is a constant danger to which the operator is exposed, and even an apparently trivial affection of this kind is undoubtedly capable of setting up blood poisoning. During an operation, microscopic injuries to the skin may take place, the operator being entirely unconscious of them, or else ignoring and forgetting them, infection sometimes being the result. In order to be on the safe side, the author has for years practiced the immersion of both hands, immediately after an operation, in a basin of alcohol for a few seconds to determine any minute trauma that might have been inflicted. The alcohol coming in contact with any part of the skin that has suffered a solution of continuity, however minute, will cause a distinct burning sensation at the site of injury, thus affording a valuable warning of the danger of infection.—F. Reder, *Interstate Med. Journ.*, per *New York Med. Journal.*

Sweating Teeth Off Soldered Plates.—At times, when it is necessary to remove an isolated tooth or clasp from a soldered denture, it can be done more quickly and with but little risk by heating under the blowpipe to nearly the fusing-point of the solder, and then dislodging it by a slight tap with the blowpipe tip or an iron rod. This method has a decided advantage when the tooth or clasp is to be replaced, as there is no mutilation of the denture or the part removed, such as is apt to be the case if a graver or fret-saw is used. To accomplish this, first thoroughly clean the denture, especially if it has been worn. Then paint over the porcelain a thin coating of creamy plaster, a mere wash. When this is hard, place the denture upon the soldering block, well supported, so as to avoid warping, and carefully direct a broad blowpipe flame upon the plate as far as may be from the teeth, and slowly heat it up, gradually approaching the part to be unsoldered with a pointed flame until the solder begins to "sweat," then promptly dislodge the tooth or clasp with a smart tap. With average care it is seldom that the porcelain is injured.—W. H. Trueman, *Dental Brief.*

Soldering Dowels for Crowns.—Inasmuch as the dowel uniting the crown to the root is the bond between the two on which the permanence of the crown depends, special care is called for to make its union with the crown secure. Gold and platinum alloys, and also the various cheaper alloys used in the ready-made dowels on the market, are somewhat difficult to solder, the solder at times flowing around them without uniting, and at all times, if held only by the area of the end of the dowel, the joint is not secure. It is best to always depress the cap around the hole made for the dowel, so that there will be a body of solder around the dowel if the end of the dowel projecting above the cap must be filed down close to the cap when adjusting the tooth. It is a wise precaution to flow around the dowel, about where it is to be soldered to the crown, high-karat solder or pure gold, raising the temperature sufficiently high to make it flow freely; the solder will then take hold more kindly and a stronger union will result. With these alloys it seems that a high temperature is needed in soldering, rather higher than is safe when soldering them to the cap, especially when the investment favors the cap receiving a larger share of the heat applied, the dowel being surrounded by the heat-nonconducting investment.—W. H. Trueman, *Dental Brief.*

Action of Hydrogen Dioxid on the Flavoring Agents of Mouth-washes.—In order to ascertain how far hydrogen dioxid as a constituent of mouth-washes would spoil their flavor on keeping, by its oxidizing action on essential oils, etc., a number of mixtures were made up containing 40 gm. of alcohol (90 per cent.), 30 gm. of water, 25 gm. of hydrogen dioxid (12 per cent.), and 0.05 gm. of the essential oil or other substance under experiment; these were kept for two months and then compared, as to taste, with mixtures of similar composition, but freshly prepared. In some cases no change was detected, in others the flavor was much diminished, while in others again it had undergone alteration and was much less agreeable. The substances which were much changed or weakened were geraniol, menthol, menthyl acetate, peppermint oil, and cinnamic aldehyd; the action was less in the case of carvacrol, eugenol, oil of geranium, oil of cloves, and terpinol; while the following were quite unchanged: Anethol, oil of anise (and star anise), bornyl acetate, eucalyptol, oil of eucalyptus, pine oil, and thymol.—*Apotheker Zeitung* per *British Dental Journal.*

Treatment for Nausea.—Occasionally a patient presents who is subject to extreme gagging and nausea, occasioned by the application of the rubber dam or by taking a plaster impression. This is most frequently noticed in mouths of smokers, high livers, and those addicted to the use of alcoholic liquors. The writer has found the following treatment most beneficial: The mucous tissue of the mouth and the palate are painted daily for one week with a 10 per cent. silver nitrate solution; then the following mixture is prescribed, to be taken internally:

℞—Potassii bromidi,	drams 2;	
Ammonii bromidi,	dram 1;	
Extract. cannabis indicæ,	m. xxx;	
Spiritus menth. pip.,	m. xx;	
Essence of pepsin,	oz. 2.	M.

Sig.—One tablespoonful every three hours for two of three days prior to the operation.

Prior to taking impressions the entire mucous surface of oral cavity is sprayed or painted several times with a 2 per cent. cocain and campho-phénique solution (10 grains of powdered cocain to one fluidounce of the original package of campho-phénique).—B. L. Thorpe, *Dental Brief.*

Nitrous Oxid and Oxygen Anesthesia.—The disadvantages of this form of anesthesia are as follows: (1) It requires experience to acquire the necessary skill. (2) The apparatus is cumbersome. (3) There is occasionally incomplete muscular relaxation. (4) There is a somewhat increased venous hemorrhage. (5) In operations on the nose and throat, where prolonged anesthesia and relaxation are desirable, it is not as yet satisfactory.

This form of anesthesia is, however, advisable in many cases, because—(1) It is safe. (2) The natural immunity is not affected nor is the blood harmfully disturbed. (3) There is no tendency to light up an old and quiet tuberculous focus. (4) There are no known bad after-effects upon the lungs, kidneys, or other parts of the body. (5) By the method of rebreathing, the carbon dioxid acts as a stimulant to the vasomotor center, preventing shock and slowing a rapid pulse. (6) The method of rebreathing aids in the preservation of the body temperature. (7) Oxygen, the best resuscitator, is an integral part of the anesthetic. (8) Anesthesia is rapidly and pleasantly induced. (9) Recovery is almost immediate and is remarkable for the absence of symptoms. (10) Ether may be given in the most approved method without removal of the facepiece. (11) Owing to the absence of post-operative illness, early nourishment can be given, and convalescence is shortened.—P. J. Flagg, *New York State Journal of Med.* per *New York Med. Journal.*

Care of the Mouth.—Hermann Prinz, in the *Interstate Medical Journal*, states that authorities differ widely as regards the ideal oral antiseptic. A mild antiseptic effect is obtained from physiological salt solution heated to body temperature. To sterilize the oral cavity completely is both impossible and inadvisable, powerful antiseptics tending to injure the tissues. Experience and research have shown that a solution of alcohol, hydrogen dioxid, resorcinol, and zinc chlorid in carefully adjusted proportions, with the necessary flavoring agents, not only produces the desired results, but conforms to the taste of most patients, consequently insuring continuous use: Resorcinol one dram, zinc chlorid 10 grains, menthol 20 grains, thymol 15 grains, oil of wintergreen (synthetic) 15 minims, alcohol 2 ounces, hydrogen dioxid solution 3 ounces, water enough to make 8 ounces. One teaspoonful of this is to be added to half a tumblerful of warm water, and the resulting solution used as a mouthwash and gargle. Each mouthful taken should be gargled with for from one-half to one minute, and the fluid also forced back and forth between the teeth. In conjunction with the wash, a suitable tooth-powder should be employed, as for instance the following: Precipitated calcium carbonate 2 ounces, powdered Castile soap 1 dram, oil of peppermint 20 minims. The mechanical application of the brush, toothpick, floss silk, etc., is also important. The gums should receive additional attention by light massage with the wet finger-tips, a rotary movement being employed.—*New York Med. Journal.*

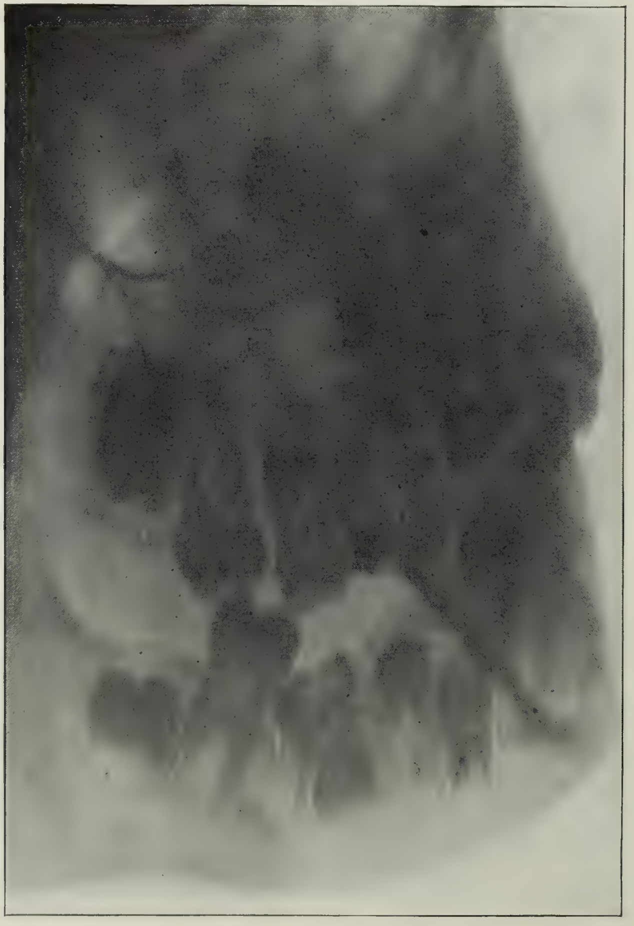
HINTS, QUERIES, AND COMMENTS.

IMPACTED DECIDUOUS MOLAR.

THE patient, a boy of eight years, had been under my care for over a year. The mother, being watchful, had brought him to my office frequently for my observation. The mesio-buccal cusp of the molar was only to be seen after a deep incision through the gum, but a slight opening was constantly present, allowing the sounding of the occlusal surface of the tooth with an explorer.

After repeated visits, it was decided that there was extensive caries in this tooth, and that most of the crown surface was well covered with bone. The mother was informed that it would be best to verify this opinion

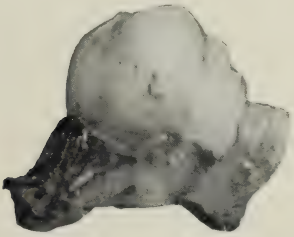
FIG. 1.



by having an X ray taken. This was willingly conceded, and a complete verification of the diagnosis was obtained.

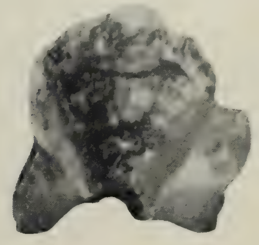
The use of nitrous oxid was found insufficient, consequently it was decided to take the patient to a hospital. Under ether anesthesia a surgeon removed the external alveolar plate, and the deciduous molar was extracted in a buccal direction.

FIG. 2.



The radiograph (Fig. 1) shows the position of the permanent in its relation to the deciduous molar, and the second bicuspid coming into position and acting as an additional force pushing the deciduous molar.

FIG. 3.



The removal of the tooth was surprisingly difficult and required nearly an hour. The large carious area (Figs. 2 and 3) confirmed the correctness of the operator's diagnosis, and justified the operation, which was eminently successful.

GRAFTON MUNROE, A.M., D.D.S.
Springfield, Ill.

NEW SADDLE BRIDGE.

THE arrangement of a saddle bridge is always a difficult problem. It is generally understood that saddle bridges sooner or later cause trouble; their proper construction, therefore, is of great importance. There are many devices; but I will not describe any of them except the one which I have recently used with splendid success, and which is shown in the accompanying illustrations. Fig. 1 shows an ordinary cast, with the molars missing. Fig. 2 shows the remaining bicuspids crowned with shell crowns. Fig. 3 shows the bridge with a molar set in place, and attached to the bicuspid crown.

FIG. 1.

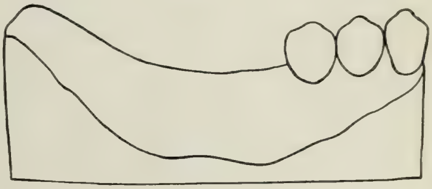
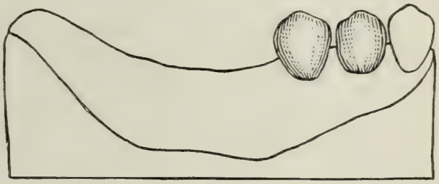


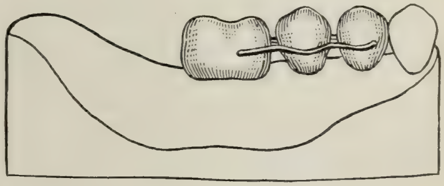
FIG. 2.



CONSTRUCTION.

The construction of this bridge offers very little difficulty to a practical operator, the principle upon which it is built being the chief consideration. After making the shell crowns, an impression of them is taken, and they are soldered together. Then they are polished up and replaced in the mouth, a double impression is taken with modeling compound, and a cast and bite are made. A

FIG. 3.



piece of iridio-platinum wire is selected, sufficiently strong to withstand the stress that will be put upon the bridge. This wire is made to conform to the shell crowns by fitting it to the anterior bicuspid buccally and lingually, the end of the wire to reach a little mesially from the center. This wire must not grip the posterior bicuspid when the bridge is in use, as the principle of the bridge depends upon this fact.

The principle upon which this bridge works is as follows: The spring wires being attached to the anterior bicuspid and passing freely around the posterior one, but not being fastened to it, represent a reciprocal joint, and support the bridge in such a way that it is always in place on the gum.

Edwin P. Wright, D.D.S.

Richmond, Va.

A METHOD OF ANATOMICAL ARTICULATION OF TEETH AFTER VULCANIZATION.

This is not intended to be a scientific treatise on anatomical articulation, the subject having been ably presented by many closer observers than myself, but is rather an attempt to explain my method of arriving at satisfactory results in articulating teeth to give the maximum of comfort and usefulness to the wearer, without sacrificing esthetic appearance. The descriptions given us in the magazines and text-books for setting-up and grinding teeth anatomically are so intricate and exacting, and require so much skill and time, that few have taken up this most important feature of the construction of artificial dentures. Furthermore, these writers tell us that we must wait until the manufacturers comply with our demands by furnishing anatomical molds, a few having already done so. By the method about to be described, however, any teeth can be used, although those with the larger occlusal surfaces in the new molds are of a greater advantage. The technique consists in taking the impressions and bite as usual, mounting the models on a plain-line articulator, setting up the teeth, trying them in the mouth, obtaining the proper occlusion and overbite, and arranging for appearance to suit the operator and the patient. The process thus far is identical with that usually employed. The teeth are then vulcanized and finished off and tried in the mouth. Then the operator should proceed as follows: To take the bite for anatomical—or, as I prefer to call it, balanced—articulation, a roll of wax of the size of a finger is warmed, and a piece is placed on each side between the molars. The patient is then asked to bite with the chin protruded, closing until the incisors meet edge-to-edge. The wax pieces are removed carefully, and preserved until later.

The next step consists in placing a sheet of warmed base-plate wax between the artificial teeth clear around to secure the correct occlusion, which is obtained by the patient biting with the mandible in its most retracted position. Instead of instructing the patient to swallow, the tongue is now placed in the roof of the mouth—or any of a dozen other positions might be suggested. I simply place the palm of my hand on the chin, my left hand resting on top of the patient's head, and say, "Close." At the same time I firmly press the chin backward. It is unwise to say: "bite," for that suggests incising with the front teeth, and the patient is sure to protrude the lower jaw; but by asking the patient to close, a perfect occlusion will be obtained every time. Both plates are then removed and waxed together firmly with hard sticky-wax in the position indicated by the sheets of wax between the teeth. The bite tray of the Snow face-bow is then attached to the upper plate securely with sticky-wax, the dentures are replaced in the mouth, and the patient is asked to hold the jaws firmly together while the face-bow is adjusted with both hands free, a process which is no doubt too familiar to require description. The face-bow is used to locate and transfer three important points in grinding the articulating surfaces. First, the distance from the condyles to the mesial edges; second, the horizontal level of the alveolar processes in relation to the condyles, third, the parallel relationship of the ridges and condyles. These important relative positions are transferred by the face-bow from the patient's face to the articulator, and vary so widely that no standard or average will do, and each case must be carefully transferred in this manner. The little slides on the face-bow are adjusted to fit over the condyles—which are, approximately, one-quarter inch in front of the floor of the ear. The thumb screw that holds the face-bow to the bite-tray is firmly tightened, the face-bow and dentures are removed and attached to the articulator in the same relationship to the condyles as existed in the mouth. When the plaster is hard, the face-bow and the bite-tray can be removed. The next step consists in setting the slides or condyle paths to correspond with the individual case. The nut which holds the hinge is loosened, the spring detached, and the two wax bites that were first taken are placed so as to allow the teeth to set accurately in these, and again the hinge nuts are tightened.

The spring is then attached, and the lower jaw can be moved then precisely as the patient does in mastication. The teeth are ground until they balance in all positions. The articulator can be swung, and, when the plates are again placed in the patient's mouth, they will be serviceable from the first. Any operator who wishes to practice this method need not wait for a favorable case, but should send for some patient who is wearing a full upper and lower denture, and secure a face-bow bite, and grind the teeth, and see the result. Even teeth that have been anatomically set and correctly articulated seldom come from the vulcanizer quite right; either the slides on the flask become worn, surplus rubber prevents perfect closure, or some one of a dozen unaccountable causes render it necessary to do a little grinding after trying the plates in the mouth. Why not, therefore, do it all at once, for the advantages are many. The plates stay in place much better than base-plates. All in all, this method has afforded me splendid results, and, as I find it far simpler than any process heretofore understood by me, I take this opportunity to induce others to help their patients and themselves.

W. G. Bridge, D.D.S.

Montpelier, Vt.

OBITUARY.

DR. CARL FRIEDRICH WILHELM BÖDECKER.

Died, at Berlin, Germany, on Monday, April 29, 1912, of peritonitis following an abdominal operation, in his sixty-sixth year, Carl Friedrich Wilhelm Bödecker, M.D.S.

In the demise of Prof. Dr. C. F. W. Bödecker, the dental profession has lost a most conspicuous member, of world-wide renown, whose remarkable achievements as a practitioner, teacher, and research worker have materially contributed to the advance of modern dental art and science.

Carl Friedrich Wilhelm Bödecker was born at Celle, Hanover, on July 6, 1846, as the son of Heinrich and Doris (Lohman) Bödecker. He attended the schools at Celle until 1856, when his father removed to Pine, to accept the position of superintendent of an iron-mining company, where young Bödecker continued his studies for three years. In 1859 he entered the Egidian school in Hanover, where he remained for two years. For the following five years he was an apprentice to a jeweler and dentist in Celle. In 1866 he went to England, and, after spending some months in London, proceeded to Newark, in Nottinghamshire, where he became assistant to a prominent dentist for three years. During this period he also studied medicine under a London physician.

In 1869 he came to the United States, and entered the College of Dentistry in New York city. In the evenings he pursued extra courses in physics and chemistry at Cooper Institute. After two years he was graduated at the New York College of Dentistry, receiving the first (faculty) prize and an appointment as assistant professor of chemistry in that college, which he accepted and held for two years.

Immediately upon his graduation he had affiliated himself with the First District Dental Society, and entered upon a dental practice in the city of New York. In 1877 he passed with honors the examination held at Albany for the degree of M.D.S., and in July of that year entered the pathological laboratory of Dr. Carl Heitzman. In 1878 he was elected a member of the New York Odontological Society, and was appointed one of four members of the dental profession from the State Society of New York to be represented in the album entitled "The Public Service of the State of New York." Later for two years he held the position of lecturer on dental histology at the New York College of Dentistry, and for four years was professor of dental embryology in the University of Buffalo, after which he retired with the title of emeritus professor. For nine years he was chairman of the clinic of the First District Dental Society. He also was chairman of the dental clinic in the Ninth International Medical Congress, held at Washington, D. C., in 1887. During the World's Columbian Dental Congress, held in Chicago in 1893, he presided over the Committee of Clinics in Operative Dentistry and Oral Surgery.

In 1897 he took up his residence in Berlin, Germany, where he practiced until the death of his wife, in 1907. Since then he has spent much of his time in traveling all over the world, and had only just returned from a long voyage through India and Ceylon when death supervened.

He published a work, "The Anatomy and Pathology of the Teeth" (1894), which was translated into German, and also a number of papers on subjects concerning that branch of dental science. He was also connected with the publication of the *Independent Practitioner*. In the last years of his life he became interested in the question of the disinfection of the mouth, and spent some time in studying this subject.

He retained until his demise his membership in several dental societies, among which were the International Dental Federation and the First District Dental Society of New York. He was elected a member of the Foreign Advisory Board of the N. A. D. F., an honorary member of the Central Dental Society of Northern New Jersey, the California State Odontological Society, the American Dental Society of Europe, the Central Verein Deutscher Zahnaerzte, the Svenska Tandläkare-Sällskapet of Stockholm, and the W. D. Miller Dental Club of Berlin.

Deceased married Miss Wilhelmine Himbeck of Bremen, Germany, on May 4, 1874, in New York city. He is survived by two sons, H. W. C. Bödecker and C. F. Bödecker, both eminent practitioners of dentistry.

Interment was made at Wannsee, near Berlin, Germany.

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DENTAL COLLEGE COMMENCEMENTS.

GEORGE WASHINGTON UNIVERSITY, DENTAL DEPARTMENT.

THE annual commencement exercises of George Washington University Dental Department were held in Memorial Continental Hall, Washington, D. C., on June 5, 1912.

An address was delivered by John Randolph Dos Passos.

The degree of Doctor of Dental Surgery was conferred on the following graduates:

Stuart M. Angelo	Virginia
Harry Bingman	Pennsylvania
Robert C. Fowler	District of Columbia
Leon H. Fradkin	Russia
Melicu M. Michaels	South Carolina

UNIVERSITY OF MICHIGAN, DENTAL DEPARTMENT.

The sixty-eighth annual commencement exercises of the Dental Department of the University of Michigan were held in Ann Arbor, Mich., on June 27, 1912.

The commencement address was delivered by Prof. Jeremiah W. Jenks, LL.D.

The degree of Doctor of Dental Surgery was conferred on the following graduates:

Paul R. Alexander
Edward J. Anderson
Floyd M. Annis
Herbert S. Bailey
Kurt E. Berend
J. Harry Birkett
Karl E. Bliss
Arturo Bordato
Wm. N. Brewer
Arthur W. Bruce
Clay J. Bullis
Ray W. Burch
Wm. L. Burk
Albert B. Carson
Waldo M. Coburn
Felix B. Cooper
Roy W. Cooper
George W. Cosper
Percy D. Crum
Claude V. Curdy
Frank J. Dengler
Joseph E. Denhart
Stephen F. Devereaux
John M. Foley
Wade S. Forth
Pyrle A. Fowler
Bernard B. Frankel
Adam J. Frydrycks
Paul L. Gardner
Frank L. Hardy
Kanji Kamitani
Krikor M. Khantamour
Paul J. Kuebler
Rufus Leigh
Frank A. Limpert
John H. Longe
Alberto A. Lopez
Arthur F. Lowry
Nathan O. Lynn
George W. MacKay
Paul E. Margeson
Wm. A. Matheson
Wilbert S. Mathias
Ralph Miller
Earl A. Morrison
Alfred J. Munson
Morton D. Olcott
Clarence M. Orser
Ralph F. Phillips
Harry J. Post
Chester F. Pryor
Andrew E. Rasmussen
Alexander Rehag
Clarence S. Ruby
Stanley R. Ruthven
Alfred T. Rycroft
Thomas Scott
Lawrence C. Shonerd
Haskell J. Sweet
Allan M. Taylor
Edwin H. Taylor
Arthur H. Terrill
Glancy G. Thomas
Halbert C. Thomas
Victor Thompson
Harold L. Vernon
Frederick L. Walter
William D. White
William H. Wotton

NORTHWESTERN UNIVERSITY, DENTAL DEPARTMENT.

The fifty-fourth annual commencement exercises of the Northwestern University, Dental Department, were held on Wednesday, June 12, 1912, in Evanston, Ill.

The degree of Doctor of Dental Surgery was conferred on the following graduates:

Aaron M. Aaronian
Axel W. Akesson
Antoine L. M. J. H. Amoëdo
Alpha B. Applebee
William Babcock
George W. Bailey
Ralph T. Ball
Harry L. Basford
L. P. Basford
Feris A. Bass
Ernst V. Bodorff
Thomas E. Boone
Charles T. Brady
Fred J. Braxton
Thomas T. Carlisle
William R. Cashin
Camillus C. Collins
John R. W. Cook
Earnest E. Corby
June W. Croessmann
Corydon A. Culp
Cecil G. H. Cusack
John H. Davis
Andrew A. Deans
Albert L. Deeble
George D. Dore
Robert M. Dunlop
Verna R. Dush
Eskill W. Edlund
Bruno A. Etzbach
Edward G. Faller
Gustav R. Freedlund
Charles W. Freeman
Louis G. Freeman
James H. Genter
Edson J. Gish
James M. Green
Eugene P. Hanrahan
Herbert N. Harmon
Julius C. Harris
Fred N. Hobson
Augustus K. Hoffman
Johan Hojem
Edmund J. Hughes
Roy Jamieson
Ernest W. H. Johnson
Ernest Kennedy
Maxie L. Kroschel
Leif Larsen
Oliver R. Linn
William J. Love
Hugh McC. McElrath
Frank Macko, Jr.
Roy A. Marshall
Robert R. Massey
Clyde M. Mattice
Guy M. Miller
St. Clair Murfey
Alex C. Nelson
Kenichi Numa
John M. Parson
John G. Pelton
Nathan C. Pickels
Merton M. Postle
Milton F. Randolph
Daniel W. Rapp
Warren E. Rice
William J. Rice
Neil O. Rogers
Chester R. Root
Leonard A. Rose
Thomas J. Rowland
Bernard P. M. Schröder
Karl L. Schrup
George F. Schweiger
Roscoe M. Sheetz
Leo J. Shoore
Edward LeR. Sieber
Manuel S. Simon
Claude W. H. Skinner
George E. Smith
Joseph W. Stamp, Jr.
Wm. A. Stander
John A. A. Stenborg
George J. Stephens
Collins W. Swords
Pliny L. Tawney
Allison L. Tull
Merle H. Tuttle
George E. Ulvestad
Clyde Unseitig
Henry J. Urbanowicz
Julio J. van der Henst
Charles H. Vaughan
Arnold E. Vyverberg
Alfred Weding
John D. Williams
Leland S. Wilson
Yōnekichi B. Yoshida
Roy M. Young

UNIVERSITY OF MINNESOTA, COLLEGE OF DENTISTRY.

THE fortieth annual commencement exercises of the University of Minnesota, College of Dentistry, were held in the armory, Minneapolis, Minn., on June 13, 1912.

An address was delivered by Albert Shaw, Ph.D., LL.D.

The degree of Doctor of Dental Surgery was conferred by the president, George E. Vincent, Ph.D., LL.D., on the following graduates:

Gust E. Abrahamson
Louie T. Austin
John P. Bonner
Robert J. Bowe
Ernest J. Brosius
Lowell H. Carlson
William H. Crone
Leo P. Ganfield
Samuel Gross
Ernest R. Gyldenskog
Kenjiro Hori
Frank P. Hosterman
Burnett T. Johnson
Ernest S. Johnson
George E. Johnson
Henry Johnston
Arthur J. Kelly
Bert H. Kerr
Sylvester Koontz
George M. Krough
Roy C. Lang
Gustave E. Larson
Frank J. Lenz
Harold J. Leonard
Alfred C. Lier
Thomas E. McLean
Benjamin L. E. Maertz
Robert L. Matthews
Thomas J. Mee
William E. Mentzer
William C. Naegeli
Arthur F. Nellermoe
Anton Nelson
Nels B. Nelson
James N. Nesse
James W. Nixon
Mark L. Norman
William H. Ohm
Carl C. Olsen
Elvin C. Olson
John H. Onstad
Arthur B. Ostrander
Enoch Peterson
Harold A. Peterson
Arthur J. Quesnell
Benjamin S. Rauch
George H. Record
Otis H. Reynolds
Kenneth L. Rice
Robert E. Richardson
Hugh W. Ritchie
Henry R. Richter
Gustav A. Roelke
George H. Rowell
Wilhelm F. U. Saethre
Thorwald C. Selvig
Alfred W. Simonson
Kenneth V. Smith
Finn Solberg
Abe A. Steinfeldt
Theodore Swendsen
Edward G. J. Wolf

TUFTS COLLEGE, DENTAL SCHOOL.

THE fifty-sixth annual commencement exercises of Tufts College, Dental School, were held in Boston, Mass., on June 19, 1912.

The degree of Doctor of Dental Medicine was conferred on the following graduates:

Henry R. Allen
LeRoy S. Austin
Karl A. Bohaker
Guy E. Brown
Francis B. Bruce
Louis H. Cadorette
Walter J. Carter
George Christman
Chester E. Cleaves
Michael E. Cosgrove
Peter Costello
Daniel J. Crowley
Mildred G. Dixon
Michael J. Dunne
Hector M. Dupuis
Harold G. Ekdahl
George F. Fair
John H. Feeley
Joseph Finkelstein
Richard J. Fitzgerald
Robert C. Foster
Edward J. Gately
John J. Gibbons
Ernest G. Graumann
Harry A. Greene
Arthur S. Hamilton
Harry S. Hammond
Patrick S. Hartnett
Walter F. Harvey
Clarence M. Haskell
Edmund G. Haskell
Arthur W. Hayes
Leon W. Hildreth
Paul C. Hobart
Louis Kaston
John J. Kearney
James H. Keith
Rene Kenswil
Edward A. Kinley, Jr.
George Kramer
Peter E. Ladieu
Michael A. Landers
Richard B. Larkin
Timothy F. Leary
Henry H. Leavitt
Owen J. Logue
Daniel S. Long
William R. Messer
George A. Monahan
Richard J. Mulcahy
Louis Olin
Harry C. Peavey
David Pinsky
Lester H. Plaisted
Harris W. Price
Martin W. Qualters
Howard B. Randall
Harvard J. Reilly
Jacob F. Roberts
Harry C. Ryder
Willard E. Sedgwick
Harold W. Shedd
Charles S. Spencer
George A. Springall
Harry LeB. Stalker
Dean C. Stevens
William D. Taylor
James F. Tierney
Nathan H. Tirk
Alfred S. Wass
Karl S. Webster

LAVAL UNIVERSITY DENTAL SCHOOL.

At the commencement exercises of Laval University Dental School the degree of Doctor of Dental Surgery was conferred on the following graduates:

A. Barras	Montreal	H. LeBon	Montreal
J. Béland	Montreal	P. A. LeBon	Montreal
J. Bourdon	Montreal	L. Lemire	Montreal
L. Boutin	Montreal	A. Leprohon	Montreal
E. H. Charron	Montreal	V. Levasseur	Montreal
Ovila Cyr	Montreal	André Millot	France
L. De Guise	Montreal	E. Précourt	Montreal
H. Julien	Montreal	A. Renaud	Montreal
X. Laberge	Montreal	E. Seers	Montreal
A. Larose	Montreal	A. de Souffron	France
T. L. Larseneur	Montreal	J. Veilleux	Montreal

The degree of Bachelor of Dental Surgery was conferred on the following graduates:

E. Aucoin
E. Balthazar
M. Barbeau
R. Béliveau
S. Bertrand
A. Chamberland
J. Charest
A. Dion
A. Jinchereau
R. Lamontagne
J. Meek
A. Picard
F. Racicot
L. Sauvé
L. P. Verner

GEORGETOWN UNIVERSITY, DENTAL DEPARTMENT.

The sixty-third annual commencement exercises of the Georgetown University, Dental Department, were held on Thursday, June 13, 1912, in Gaston Hall, Georgetown College, Washington, D. C.

An address was delivered by B. Holly Smith, M.D., D.D.S., and the valedictorian was Walter G. McGauley.

The Degree of Doctor of Dental Surgery was conferred by Rev. Aloysius J. Donlon, S. J., on the following graduates:

Melvin M. Augenstein	District of Columbia	Walter G. McGauley	Massachusetts
Edward J. Boe	Minnesota	James A. Major	New York
Maurice J. Conley	New Hampshire	William C. Neely	Illinois
Leigh C. Fairbank	District of Columbia	George Paterson	New York
Thomas L. Furbershaw	New York	James W. Rogers	Massachusetts
Peter F. Groden	New York	Sidney H. Rosenthal	District of Columbia
Harry E. Harvey	District of Columbia	Frank J. Stockman	Missouri
William E. Kelly	Pennsylvania	Esmonde Sullivan	Massachusetts
John J. Lally	Massachusetts	Hans L. von Stebens	Germany
Vernon J. Lohr	Virginia	Charles E. Taylor	District of Columbia
William T. Mackey	Massachusetts	Frank M. Taylor	California
J. William Martin	Massachusetts	John C. Whitehead	Virginia
Albert V. McGlone	Massachusetts	Charles S. Warner	Maryland

SOCIETY NOTES AND ANNOUNCEMENTS.

DENTAL SOCIETY MEETINGS:

September and October.

SEPTEMBER.

DELTA SIGMA DELTA FRATERNITY. Washington, D. C. September 9th.

INTERNATIONAL CONGRESS ON HYGIENE AND DEMOGRAPHY. Washington, D. C. Six days: September 23d to 28th.

NATIONAL ASSOCIATION OF DENTAL EXAMINERS. Washington, D. C. September 6th.

NATIONAL ASSOCIATION OF DENTAL FACULTIES. Washington, D. C. Two days: September 6th and 7th.

NATIONAL DENTAL ASSOCIATION. Washington, D. C. Four days: September 10th to 13th.

NATIONAL DENTAL ASSOCIATION, SOUTHERN BRANCH. [Jointly with N. D. A., at Washington.]

XI PSI PHI FRATERNITY. Washington, D. C. [Some time, not yet announced, during N. D. A. meeting.]

OCTOBER.

NORTHEASTERN DENTAL ASSOCIATION. Crawford Notch, N. H. Three days: October 1st to 3d.

Dental Examiners.

COLORADO BOARD OF EXAMINERS. Denver. December 3d.

MASSACHUSETTS BOARD OF REGISTRATION. Boston. October 23d to 25th.

[AT WASHINGTON.]

XI PSI PHI FRATERNITY.

THERE will be a meeting and dinner of the alumni members of the Xi Psi Phi Fraternity during the session of the National Dental Association at Washington, D. C., September 10 to 13, 1912. Notice as to time and place will be announced later.

C. C. MARKEY,
Supreme Sec'y-treas.

[AT WASHINGTON.]

DELTA SIGMA DELTA FRATERNITY.

THE twenty-eighth annual meeting of the Supreme Chapter of Delta Sigma Delta Fraternity will be held at the New Willard Hotel, Washington, D. C., Monday, September 9, 1912, at 10 A.M.

Business of importance and initiation have been arranged for the day, to be followed by the annual banquet in the evening.

R. HAMILL D. SWING, *Supreme Scribe.*

[AT WASHINGTON.]

NATIONAL ASSOCIATION OF DENTAL FACULTIES.

THE National Association of Dental Faculties will meet at the New Willard Hotel, Washington, D. C., on Friday and Saturday, September 6 and 7, 1912. The Executive Committee will meet at 9 o'clock Friday morning, the general meeting opening at 10 on the same morning.

GEORGE E. HUNT, *Sec'y.*

[AT WASHINGTON.]

NATIONAL ASSOCIATION OF DENTAL EXAMINERS.

THE thirtieth annual session of the National Association of Dental Examiners will be held at the New Willard Hotel, Washington, D. C., beginning Friday, September 6, 1912, at ten o'clock A.M., and continuing until adjournment.

Delegates expecting to attend are advised to make reservation early on account of the meeting of the National Association of Dental Faculties and the National Dental Association.

HENRY L. TURNER, *President,*
St. Louis, Mo.
T. A. BROADBENT, *Sec'y,*
15 E. Washington st., Chicago.

N. D. A. Meeting at Washington, D. C.

September 10 to 13, 1912.

THE 1912 session of the National Dental Association will be held in Washington, D. C., September 10th to 13th, and all indications are favorable for this being the most important and successful meeting that the association has ever held. The association will be called to order at 10 A.M., September 10th, in the convention hall of the New Willard Hotel.

The Local Committee of Arrangements selected the New Willard as the "headquarters hotel" and for the meetings of the general sessions and the sections, as well as the "all-day clinic" on the last day. The commodious ballroom on the eleventh floor of this hotel provides ideal arrangements for a successful meeting—that is, all under one roof.

THE REORGANIZATION PROPOSITION

has been receiving most liberal support from the state societies which have met since the Cleveland meeting, at which a constitution, along the lines of the American Medical Association, was tentatively adopted. This question will come up at this meeting for final action, and everyone interested in the perfecting of a representative National Dental Association should be present.

The proposed plan of reorganization is not to become effective until 1913, but our present constitution provides that any member of a state dental society, or affiliated society, is eligible to the National. The membership fee is $5.00, which pays one year's dues and includes a copy of the official Transactions. Application blanks may be secured from the state society secretaries, must be signed by the president and secretary, and can be mailed in advance, with fee, to H. B. McFadden, treasurer, 3505 Hamilton st., Philadelphia, Pa., or handed to him or to the Credentials Committee at the time of the meeting. All reputable practitioners of dentistry are invited to attend this meeting and become actively affiliated with our association.

PROGRAM.

General Session.

Opening, 10 A.M., Tuesday, September 10th:

Invocation. Rt. Rev. Alfred Harding, Washington, D. C., Monday, September 9,

Address of welcome by Hon. C. H. Rudolph, Washington, D. C. Response, Frank O. Hetrick, Ottawa, Kans.

President's Address. Arthur R. Melendy, Knoxville, Tenn.

"Modern Dentistry in Germany." Newell S. Jenkins, Dresden, Ger.

[The following will be presented at some meeting in general session or be assigned to one of the sections, as may be thought best by the Executive Council at time of meeting.]

"Oral Dental Preparations." L. F. Kebler, Washington, D. C.

"Standardization of Materia Medica." F. E. Stewart, Philadelphia, Pa.

"What the Government is Doing to Prevent Diseases." M. C. Smith, Lynn, Mass.

Section I.

"Crown and Bridge Work." Wm. O. Hulick, Cincinnati, Ohio.

"Something About Cavity Preparation for the Gold Inlay." J. V. Conzett, Dubuque, Iowa.

"Pyorrhea Alveolaris: Its Causes and Treatment with Vaccine." Leon S. Medalia, Boston, Mass.

"Pyorrhea: Its Treatment by Bacterial Vaccines, and Results of Animal Experimentation." Geo. B. Harris, Detroit, Mich.

"The Great Need of Improvement in Quality of Commercial Alloys." C. M. McCauley, Abilene, Texas.

Section II.

"Aristocracy in Dentistry, Do We Need It?" B. Holly Smith, Baltimore, Md.

"In Hoc Signo Vinces." W. A. Lovett, Birmingham, Ala.

"Other Methods of Making Gold Inlays." H. H. Johnson, Macon, Ga.

"Extension for Prevention *vs.* Pinhead Cavities." W. R. Clack, Mason City, Iowa.

"Intimidation of Dentists and Dental Societies." Joseph Head, Philadelphia, Pa.

"The Treatment and Filling of Root-canals." J. J. Moffitt, Harrisburg, Pa.

Section III.

"Oral Sepsis and a Consideration of Its Systemic Effects." M. L. Rhein, New York, N. Y.

"Diagnosis and Treatment of the Important Destructive Diseases of the Dental Pulp." J. F. Biddle, Pittsburgh, Pa.

"Post-operative Treatment of Pyorrhea Alveolaris (Illustrated by Stereopticon)." Thomas B. Hartzell, Minneapolis, Minn.

"A Consideration of the Effects that Impure Foods and Adulterated Drugs Have upon the Human System." Harvey W. Wiley, Washington, D. C.

"Teeth and Health." Geo. E. Hunt, Indianapolis, Ind.

A preliminary program was mailed to our members, essayists and clinicians on August 3d. In addition to the above literary program it contained 270 clinics. A number of additional ones will be incorporated in the official program.

Railroad Rates.

The Trunk Line and New England passenger associations have authorized a rate of a fare and three-fifths within their territory, on the certificate plan; 100 certificates required, and a fee of 25 cents for validating same. The Southeastern passenger association advertises round-trip rates from specific points in their territory. Summer tourists' rates to eastern points may be secured in Western passenger association territory. The Central passenger association refused to make any concession, but summer tourists' rates may apply from points in this territory.

Any local railroad agent can give jurisdiction of above associations, as well as full particulars regarding rates and stop-over privileges from their particular point. Inquiry should be made regarding excursion rates to points east of Washington, as such transportation, with stop-over privileges, may be secured to better advantage.

Arthur R. Melendy, *President*,
Deaderick Bldg., Knoxville, Tenn.
Homer C. Brown, *Rec. Sec'y*,
185 E. State st., Columbus, Ohio.

FROM THE LOCAL COMMITTEE OF ARRANGEMENTS.

Washington as a Convention City.

The essential requisites necessary for a successful national convention are: Central location for place of meeting; hotel and publicity facilities; convenient and suitable accommodations for presenting program; and not the least important, interesting and pleasant surroundings.

The National Dental Association meets alternately in the West, East, and South. Washington is in the Southern division, and no southern city is so accessible to the different sections of our country as is the National Capital.

Washington supplies all of these requisites and offers much more. A city that can easily handle the enormous crowds of visitors that throng the streets every four years at the inauguration of the President of the United States is patently equipped to care for any influx of visitors at other times. Washington hotel men have become accustomed to quick expansion and contraction of business. The coming and departure of Congress, with the thousands dependent upon its sessions, and the large number of conventions which have been coming to the city in recent years have served to make irregularity in numbers at depots and hotels the regular thing. Two conventions of considerable proportions were recently held in a single hotel, with no confusion in session-halls, banquets, or accommodations.

As to publicity facilities, there is no greater news-distributing center in the United States. Correspondents representing not only all of the daily newspapers of the country and many of the foreign journals have their offices in Washington, but even the technical and trade publications have their contributors and regular correspondents at the Capital.

Every patriotic American should be familiar with the National Capital, which now well merits the often-heard titles of "The City Beautiful" and "The Paris of America." Besides the many public buildings, museums, libraries and parks, etc., the Government Departments hold thousands of features of interest to visitors.

Places of Interest.

In pleasant surroundings for the visiting delegate and his wife or daughter, who often accompany him, Washington far excels any other city of the country. It is the custom for delegates to conventions here to use much of their time seeing the hundreds of interesting and beautiful places in and about the city by means of the "Touring Washington" automobiles, upon which guides point out, as the trip proceeds, the places of especial interest. Then there are many side trips. Mt. Vernon, the home of Washington, is reached both by steamer and trolley; Alexandria, Cabin John Bridge, Arlington, and Old Annapolis, the site of the United States Naval Academy, are easily accessible by trolley cars. To the last place and to Baltimore there is a new line of heavy interurban electric cars, which travel so fast that the trip to either place is made in shorter time than by the steam roads. Washington itself, the City Beautiful, is a constant delight to the visitor, and the government departments hold thousands of features of interest to every American, and many features of special interest to delegates to conventions.

It will well repay the members of the National Dental Association to linger a few days after the meeting, or to come a few days before and spend the time visiting Washington.

Information regarding railroad rates may be secured from your local agent, as conditions vary in different sections of the country. Any agent will gladly furnish any information requested.

John H. London, *Chairman*
Local Committee of Arrangements,
926 Farragut Square, Washington, D. C.

Hotels.

The headquarters of the National Dental Association and also of the National Association of Dental Faculties is the New Willard Hotel. Meetings and clinics will be held in the large ballroom on the eleventh floor. Write the hotel and make your reservations early.

Below is given a list of the principal hotels, with their rates:

S = Single, without bath. *Sb* = Single, with bath.
D = Double, " " *Db* = Double, " "

New Willard (Pennsylvania ave., 14th and F sts., N. W.): *S* \$2.50 per day and up, *Sb* \$3.50 per day and up; *D* \$4.00 per day and up, *Db* \$5.00 per day and up.

The Raleigh (Pennsylvania ave. and 12th st., N. W.): *S* \$2.00 per day and up, *Sb* \$3.00 per day and up; *D* \$3.00 per day and up, *Db* \$4.00 per day and up.

Shoreham (15th and H sts., N. W.): *S* \$2.00 per day and up, *Sb* \$3.00 per day and up; *D* \$3.00 per day and up, *Db* \$5.00 per day and up.

Ebbitt House (14th and F sts., N. W.): *S* \$1.50 per day and up, *Sb* \$2.50 per day and up; *D* \$2.00 per day and up, *Db* \$3.50 per day and up.

Hotel Gordon (16th and I sts., N. W.; American and European): American plan, \$3.00 to \$4.50 per day; European plan, \$1.50 to \$2.50 per day.

Normandie Hotel (15th and I sts., N. W.; European): *S* \$1.50 and \$2.00, *Sb* \$2.50 to \$3.50; *D* \$3.00 to \$4.00, *Db* \$4.00 to \$6.00.

New Fredonia Hotel (H st. between 13th and 14th sts., N. W.; American and European): American plan, \$3.00 per day and up; European plan, \$1.50 per day and up.

Cochran Hotel (14th and H sts., N. W.; American and European): American plan, \$3.00 per day and up; European plan, \$1.50 per day and up.

Hamilton Hotel (14th and K sts., N. W.; American): \$2.50 per day and up.

Dewey Hotel (American and European): American plan, \$2.50 per day and up; European plan, \$1.50 per day and up.

National Hotel (6th st. and Pennsylvania ave., N. W.; American and European): American plan, \$2.50 per day and up; European plan, \$1.50 per day and up.

St. James Hotel (European plan): \$1.00 per day and up.

Grand Hotel (15th st. and Pennsylvania ave., N. W.; American and European): American plan, $2.00 per day and up; European plan, $1.00 per day and up.

FROM THE CLINIC COMMITTEE.

All-day Clinic, Friday, September 13th.

THE Clinic Committee desires to extend to all members in good standing of all dental societies a cordial invitation to attend and to clinic at the "all-day" clinic of the association, to be held at the New Willard Hotel, Washington, D. C., Friday, September 13th. The enormous ballroom, top floor of this hotel, has been secured, and the management promises us every convenience.

We call your attention to the classification of the clinical material. Every effort will be made to arrange the different events according to title and in sequence, so that the various steps in the operation may be seen at a glance, without the usual regard to chair or table. This will avoid confusion and save time, allowing the members to select and study favorite subjects without hunting all over the room.

From the materal now in hand the committee can promise a large and varied clinic. In order that we may assemble all clinicians' names and titles for the preliminary program, kindly reply at once to the chairman.

COMMITTEE.

C. J. GRIEVES, *Chairman*, Park ave. and Madison st., Baltimore, Md.
A. O. ROSS, *Vice-chairman*, 807 N. High st., Columbus, Ohio.
S. W. BOWLES, *Secretary*, 1616 I st., Washington, D. C.
W. R. CLACK, Mason City, Iowa.
A. P. BURKHART, Auburn, N. Y.
J. T. McCLENAHAN, Washington, D. C.
W. D. TRACY, New York, N. Y.
GEORGE E. SAVAGE, Worcester, Mass.
JOHN H. McCLURE, Wheeling, W. Va.
J. E. CHACE, Ocala, Fla.
E. L. PETTIBONE, Cleveland, Ohio.
H. J. ALLEN, Washington, D. C.
W. R. WRIGHT, Jackson, Miss.
C. A. LUNDY, Los Angeles, Cal.
S. H. McAFEE, New Orleans, La.
C. M. BARNWELL, Atlanta, Ga.
RICHARD L. SIMPSON, Richmond, Va.
W. H. SCHERER, Houston, Texas.

FROM THE EXHIBIT COMMITTEE.

Manufacturers' Exhibit.

THE manufacturers' exhibit during the convention of the National Dental Association in Washington, September 10 to 13, 1912, inclusive, will be held in the New Ebbitt Hotel, which is just across the street from the headquarters and the clinics. Specifications, plans, rates, and full information can be had bv addressing

CLYDE M. GEARHART, *Ch'man Exhibit Com.*,
1616 I st., N. W., Washington, D. C.

[AT WASHINGTON.]

NATIONAL DENTAL ASSOCIATION—SOUTHERN BRANCH.

FIFTEENTH ANNUAL MEETING.

THE fifteenth annual meeting of the Southern Branch of the National Dental Association will be held jointly with the National Dental Association at Washington, D. C., September 10 to 13, 1912, inclusive. Only a short business session will be held for the election of officers and transaction of such other business as may be brought before the meeting.

THOS. MOORE, JR., *Corresponding Sec'y.*

FREE DENTAL DISPENSARY OPENED AT WILKES-BARRE, PA.

THROUGH the efforts of Dr. H. M. Beck, a free dental dispensary has been established at the Wilkes-Barre City Hospital. A splendid outfit has been placed in the same, and the work is being looked after by a dental staff composed of the following: Dr. H. M. Beck, chief of staff; Dr. T. W. Thomas, secretary; Dr. A. G. Morrish, Dr. W. C. Schofield, Dr. R. G. Johns, Dr. V. A. McHenry, Dr. S. S. Warner, and Dr. Wm. Wright.

The clinic is open two afternoons each week. The staff is to be enlarged and the clinic will then be open another half-day each week.

Last month Drs. T. W. Thomas and R. C. Johns worked for ninety-eight children.

W. C. SCHOFIELD,
Wilkes-Barre, Pa.

INTERNATIONAL CONGRESS ON HYGIENE AND DEMOGRAPHY.

Washington, D. C., September 23d to 28th.

To the Members of the Dental Profession of the United States of America:

The Fifteenth International Congress on Hygiene and Demography is to be held in Washington, D. C., September 23–28, 1912, under the auspices of the United States government.

This organization is the highest authority in matters of hygiene in existence today, and this is the most important meeting of the kind held in this country in its history; and the United States government is acting as host to the fifteen nations that have so far signified their intention of participating in the coming congress. Through the courtesy of the United States government the dental profession of this country has received an invitation to contribute to its success. This is the first time that the dental profession of this country has received such recognition by the home government. Place has been made for representation of the dental profession both upon the literary program and among the exhibitors.

The opportunity for which we have been seeking—that is, the opportunity to show the important relation the human mouth bears to the health, strength, and welfare of mankind—is now before us. The influence of this congress is world-wide in its scope and it will be visited by many thousands of people who are interested in hygiene and the general welfare of mankind. If American Dentistry is to maintain its reputation throughout the world, it behooves the members of the profession of this country to unite in a general effort to have the largest, finest, and most instructive dental exhibit in the history of dentistry assembled on this occasion, and at the request of the Oral Hygiene Committee N. D. A., Dr. J. W. Schereschewsky, U.S.P.H. and M.H.S., director of the exhibition, has set aside 1000 sq. ft. of floor and 500 sq. ft. of wall space in the building which is being erected for the exhibits, to be devoted to the use of the dental profession for exhibit purposes. At the meeting of the committee held in Cleveland, March 23, 1912, a resolution was passed inviting the oral hygiene committees of all state and local organizations to co-operate with it in making a success of this exhibit. Space will be assigned in such a manner that each state, city, and town will receive full credit for contributions in this direction.

The committee earnestly requests that every member of the profession who is interested in mouth hygiene and in the welfare of the dental profession become actively interested in a campaign to make a success of this exhibit. The oral hygiene committees of the state dental societies should endeavor to place themselves in touch with local organizations in their states in an endeavor to secure aid in the way of material suitable for exhibits and money to defray the expenses of such an exhibit as this should be. The committee would ask that each state and local organization make appropriations to meet the expense of collecting, mounting, and displaying such material as would make a creditable exhibit.

The committee requests that the oral hygiene committees that can or will take part in this exhibit communicate at the earliest possible moment with Dr. W. G. Ebersole, chairman of the Oral Hygiene Committee N. D. A., 800 Schofield Bldg., Cleveland, Ohio; for local information, Dr. W. Smith Frankland, The Burlington, Washington, D. C., assistant secretary-treasurer of the National Mouth Hygiene Association for the District of Columbia.

The Oral Hygiene Committee N. D. A. instructed its secretary, Dr. Waldo E. Boardman of Boston, Mass., to communicate with Dr. Wm. H. Potter of Boston, Mass., with a view of obtaining some ideas derived from the dental exhibit shown at the International Hygiene Exhibition in Dresden, May to October 1911. Dr. Potter's response is given herewith with a view of giving some idea of how to build or prepare an exhibit of this kind:

Boston, April 13, 1912.

Dear Dr. Boardman,—In regard to the dental exhibit at the International Hygiene Exhibition in Dresden, May to October 1911, I am obliged to rely on my memory, inasmuch as I was unable to find a catalog of this portion of the department. There were in the exhibit as follows:

(1) Large numbers of anatomical specimens. Skulls; parts or skulls with teeth in

place. In this respect it was similar to the exhibition in connection with the Fifth International Dental Congress, Berlin, 1909.

(2) Orthodontia cases represented by models. Regulating apparatus.

(3) Teeth representing the progress of decay from the initial softening to the large destructive cavity.

(4) Charts showing the percentage of dental decay among people of various occupations and living under various conditions.

(5) Charts showing the influence of food and water (hard or soft) upon the percentage of dental decay.

(6) Charts giving rules for the prevention of decay.

(7) School dental clinics. A description of the most important ones of Europe, with literature giving statistics and methods of work.

(8) The analysis of saliva. Charts showing the method employed.

These are a few of the features. There were many more which I wish I could remember.

Very truly yours,
Wm. H. Potter.

Let every member of the profession who is interested write offering to do his part. Do not wait for us to write to you, for we have much to do if we undertake to make a success of this work.

At the same meeting the Oral Hygiene Committee passed a resolution inviting the dental colleges of this country to contribute to the success of the dental exhibit; and the secretaries or deans of the various colleges are requested to communicate either with Dr. W. G. Ebersole or Dr. W. Smith Frankland indicating what aid they will give in connection with the coming exhibit. It will be so arranged that each college will be assigned space for its own exhibit. Come to our aid and give us your hearty support in this work.

Appealing to every member of the profession to become actively interested in this exhibit in the interest of the dental profession as a whole, we are

Respectfully yours,
W. G. Ebersole,
B. Holly Smith,
Waldo E. Boardman,
J. V. Conzett,
S. W. Foster,
Oral Hygiene Committee N. D. A.

NORTHEASTERN DENTAL ASSOCIATION.

The eighteenth annual meeting of the Northeastern Dental Association is to be held in the Crawford House, Crawford Notch, N. H., October 1, 2, and 3, 1912. The officers and committees are doing their best to have a rousing good meeting. Please remember the dates and attend.

Andrew J. Sanger, *President;*
Edgar O. Kinsman, *Sec'y,*
Cambridge, Mass.

OHIO STATE DENTAL SOCIETY.

Meets at Cincinnati This Year.

The Ohio State Dental Society, which usually meets in Columbus, will hold its annual meeting December 3, 4, and 5, 1912, at Hotel Sinton, Cincinnati. A big meeting is assured.

F. R. Chapman, *Sec'y,*
305 Schultz Bldg., Columbus, Ohio.

MASSACHUSETTS BOARD OF REGISTRATION.

A meeting of the Massachusetts Board of Registration in Dentistry, for the examination of candidates, will be held in Boston, October 23, 24, and 25, 1912.

For application blanks and further information, apply to

G. E. Mitchell, *Sec'y,*
14 Water st., Haverhill, Mass.

MONTANA BOARD OF EXAMINERS.

Cancels Reciprocity Contracts.

The Montana State Board of Dental Examiners, at its annual July meeting, canceled its reciprocity contracts with all the states with which Montana had exchange, it being the unanimous opinion of the board that such an exchange was not of any benefit either to Montana or to the states concerned.

R. R. Rathbone, *Judiciary Committee,*
Dillon, Mont.

COLORADO BOARD OF EXAMINERS.

The next regular meeting of the Colorado State Board of Dental Examiners will be held at the Capital, in Denver, beginning Tuesday, December 3, 1912.

All applications for examination must be filed with the secretary before that date. Examinations are theoretical and practical, and applicants must be prepared to do such practical work as required.

For further particulars, address

J. L. Howell, *Sec'y*,
532 Mack Block, Denver, Colo.

PRIZE COMPETITION

OF THE

Zentralverband der Oesterreichischen Stomatologen.

In view of the tenth anniversary of its organization, the Zentralverband offers a prize of K.500.00 ($100.00) for the best heretofore unpublished essay on any subject of stomatology. Only those papers which are submitted by medical men and dentists to the president of the association (Vienna I, Graben 31) between March 1, 1912, and February 28, 1913, will be admitted to the competition.

An essay cannot be withdrawn after once having been handed in.

The judges reserve the right to divide the prize into two equal parts, should two essays of equal value be submitted. If none of the essays is adjudged worthy of the prize, the competition may be kept open for a further period not exceeding two years.

The author agrees to place his work at the disposal of the *Oesterreichische Zeitschrift fuer Stomatologie* for original publication.

The essays must be handed in ready for publication, and will if possible appear within the period open for the competition. Every essay published will be paid for at the usual rate of K.80.00 ($16.00) per galley. The cost of printing, including the illustrations, will be borne by the journal.

For the Zentralverband der Oesterreichischen Stomatologen:

Dr. W. Herz-Fraenkl, *Pres.*,
Dr. Rudolf Bum, *Sec'y*.

EXAMINATION OF DENTISTS FOR THE UNITED STATES ARMY.

The Surgeon-general of the army announces that examinations for the appointment of acting dental surgeons will be held at Fort Slocum, N. Y.; Columbus Barracks, Ohio; Jefferson Barracks, Mo.; Fort Logan, Colo., and Fort McDowell, Cal., on Monday, October 7, 1912.

Application blanks and full information concerning these examinations can be procured by addressing the Surgeon-general U. S. Army, Washington, D. C.

The essential requirements to securing an invitation are that the applicant shall be a citizen of the United States, shall be between twenty-one and twenty-seven years of age, a graduate of a dental school legally authorized to confer the degree of D.D.S., and shall be of good moral character and habits.

Acting dental surgeons are employed under a three years' contract, at the rate of $150 per month. They are entitled to traveling allowances in obeying their first orders, in changing stations, and in returning to their homes at termination of service. They also have the privilege of purchasing certain supplies at the army commissary. After three years' service, if found qualified, they are promoted to the grade of dental surgeon with the rank of first lieutenant, and receive thereafter the pay and allowances appertaining to that rank.

In order to perfect all necessary arrangements for the examination, applications must be in the possession of the Surgeon-general at least two weeks before the date of examination. Early attention is therefore enjoined upon all intending applicants. There is at present a large number of vacancies to be filled.

ARMY DENTAL SURGEONS.

Memoranda of Changes.

For the week ending July 20, 1912:

Charles DeW. Deyton, act.d.s. July 11th, ordered to Vancouver Barracks, Wash., for duty.

Chas. B. Seely, Jr., act.d.s. July 15th, reports for duty at Ft. Sam Houston, Texas.

For the week ending July 27th:

Mortimer Sanderson, act.d.s. July 18th,

relieved from duty at Ft. Monroe, Va., and ordered to duty at Ft. Slocum, N. Y.

First Lieut. Edwin P. Tignor. July 18th, relieved from duty at Ft. Slocum, N. Y., and ordered to duty at Ft. Monroe, Va.

Chas. De. W. Deyton, ACT.D.S. July 20th, left Erwin, Tenn., *en route* to take station at Vancouver Barracks, Wash.

First Lieut. Alden Carpenter. July 21st, left West Point, N. Y., on thirty days' leave of absence.

First Lieut. Geo. E. Stallman. July 22d, reported for temporary duty at Ft. Bliss, Texas.

For the week ending August 3d:

First Lieut. Edwin P. Tignor, Fort Monroe, Va., will proceed to the posts named, and report to the commanding officers for temporary duty for the purpose of rendering dental service during the periods indicated [itinerary embracing dates to December 31st]: Ft. DuPont, Del. (including Ft. Mott, N. J.); Ft. Howard, Md.; Washington Barracks, D. C.; Ft. Myer, Va.; Ft. Washington, Md. (including Ft. Hunt, Va.); Ft. Monroe, Va.

Mortimer Sanderson, ACT.D.S. July 30th, on temporary duty at Ft. DuPont, Del., will return to Ft. Monroe, Va., for temporary duty, and upon completion thereof will proceed to Ft. Slocum, N. Y.

For the week ending August 10th:

A. T. Knoderer, ACT.D.S. August 4th, reported for temporary duty at Ft. Barrancas, Florida.

Mortimer Sanderson, ACT.D.S. July 31st, left from temporary duty at Ft. Slocum, N. Y., for station and duty.

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UNITED STATES PATENTS

PERTAINING OR APPLICABLE TO DENTISTRY

ISSUED DURING JULY 1912.

July 2.

No. 1,030,868, to REUBEN C. BROPHY. Vacuum casting device.

No. 1,030,856, to JAMES W. ABBOTT. Guard-sleeve for dental spindles.

No. 1,031,332, to LEO E. EVSLIN. Artificial tooth.

No. 1,031,533, to WILLIAM F. DAVISON. Rubber-dam clamp.

No. 1,031,609, to LYMAN L. ZARBAUGH. Syringe nozzle attachment.

July 9.

No. 1,031,737, to PHILIP H. SANDS. Dental wax remover.

No. 1,032,103 to WILLIAM W. ATKINSON. Facing and backing.

No. 1,032,241 to WALTER F. RICHARDS. Attachment for dental lathes.

July 16.

No. 1,032,833, to JAMES W. IVORY. Dental cervical margin clamp.

No. 1,033,022, to FRANK E. KRESS. Folding tooth-brush.

July 23.

No. 1,033,489, to ARTHUR W. TATHAM. Art of making wax patterns for casting.

No. 1,033,562, to ERNST ELTNER. Dental articulator.

No. 1,033,592, to CARL S. JORGENS. Water-dropper for dental handpieces.

No. 1,033,743, to JEROME J. SMIDDY. Tooth-brush.

July 30.

No. 1,033,819, to GEORGE M. MCMANN. Dental syringe.

No. 1,033,942, to STEWART D. RUGGLES. Dental instrument.

THE

DENTAL COSMOS.

VOL. LIV. OCTOBER 1912. No. 10.

ORIGINAL COMMUNICATIONS.

FILLING ROOT-CANALS WITH AN IMPROVED PARAFFIN COMPOUND.

By **HERMANN PRINZ, M.D., D.D.S.**, St. Louis, Mo.

FROM THE RESEARCH LABORATORY OF WASHINGTON UNIVERSITY DENTAL SCHOOL.

(Read before the Dental Society of the State of New York, at its annual meeting, at Albany, May 9, 1912.)

ONE of the most subtle operations in the routine procedure of conservative dentistry is the filling of root-canals. In the great majority of cases, the successful completion of this operation requires an extraordinary amount of dexterity and an abundant stock of patience. Aside from the intricate technical requirements, which are primarily based on a thorough knowledge of dental anatomy and which can be mastered only by diligent practice, the materials employed for such purposes are of equal importance. Regarding the physical and chemical nature of the various root-filling materials, apparently the greatest diversity of opinion exists. Only recently a writer on this subject enumerated over two hundred and fifty-odd compounds and methods of their application. This *tohu-wabohu* is largely the result of empirical practice based on *a priori* conceptions. Comparatively little experimental work has been done; clinical observations alone have been the guide-posts for this operation. With the progress of our knowledge of dental pathology and its recent addition—bacteriology—the demands on the nature and functions of the substances employed as root-canal obturators have materially increased, and consequently what at one time was considered a perfect root-filling, as, for instance, a plug made of leaf gold, is today considered wholly inadequate for that purpose.

HISTORY OF ROOT-CANAL FILLING.

In the early records of the practice of conservative dentistry—*i.e.* in the works of Fauchard (1728), Bourdet (1757), Hunter (1778), and others—we are informed that whenever a "nerve" in a tooth is exposed and diseased, it should be destroyed by the actual or the potential cautery, which, however, as the closely observing Hunter remarks—"is not always possible." These early authors also referred to the medicinal treatment of the "fangs," the French dentists being especially partial to the use of "essence de girofle" (oil of cloves), and Hunter prophetically emphasized antiseptic procedures of a somewhat similar nature as being essential for the future preservation of the tooth. Cotton, saturated with an essential oil, was usually sealed into the root-canal prior to the final filling of the tooth cavity. The use of soft metals for such purposes—*i.e.* gold, lead, or tin—was instituted later. It is quite certain that the better class of American dentists practiced the filling of root-canals at the beginning of the nineteenth century. In 1826, the international Koecker stated that—"The practice of dentistry has reached a state of development in the United States which is higher than in any other part of the world, although very little is published by American dentists." Fortunately, certain proofs are available to the student of dental history which make it plain that root-filling must have been a well-known procedure to the high-class practitioners in those days, for we find among other data a bill rendered in 1824 by Edward Hudson, a well-known Irish dentist, who practiced in Philadelphia from 1805 to 1833, in which he speaks of "stopping the cavity of one tooth from the end of its root with gold." The latter material was in common use for such work up to the early seventies of the last century, and such men as Maynard, Barker, Dunning, Foster, Westcott, Palmer, McKellops, and a host of others, were strong advocates of its special fitness for this purpose. In 1849, the once famous Hill's stopping was introduced as a general filling material, and soon was advocated as a suitable root-filling compound. In the early seventies it was succeeded by a solution of gutta-percha base-plate in chloroform, which, however, was quickly modified by employing a solid cone of gutta-percha in conjunction with this solution. As a close second, oxychlorid of zinc cement, which was introduced in 1856 by Sorel, and was familiarly known as Houghton's or Roberts' *os artificiel*, was highly prized by many operators as being the most suitable material for the permanent obliteration of root-canals. Apparently, the closely observing practitioners of the past were aware of the fact that a root-canal deprived of its natural contents—*i.e.* the pulp—must be filled with some substance in order to prevent the seepage of serum and the subsequent pathologic disturbances arising therefrom. This same rationale, with slight modifications, forms the basis of our modern conception of filling root-canals.

THE OBJECT OF FILLING ROOT-CANALS.

The primary object of filling a root-canal is to replace as perfectly as possible the artificially or pathologically destroyed pulp with a solid, unchangeable, and inert substance. If the canal is not filled, serum will seep into it from the apical tissues. The serum furnishes nutrient material for the micro-organisms present in the tubuli of a primarily infected root-canal. In a sterile canal, endogenous infection may occur via the circulation, as Faisztl(1) has recently shown experimentally. This same mode of infection may take place in cases where the pulp of a sound tooth has died as a result of some traumatic insult. In both instances, secondary infection of the pericementum, with its sequences, will usually occur in due time. The specific materials used as root-canal obturators should, according to Miller, Dunning, and others, possess the following qualifications: (1) The material should be non-putrefactive; (2) it should possess permanent antiseptic qualities; (3) it should be easy of introduction; (4) it should not irritate the soft structures beyond the foramen; (5) it should not discolor the tooth substance; (6) it should not be porous and should remain unchanged as to form; (7) it should, in case of necessity, be easy of removal; (8) as Mayrhofer has suggested, it should seal the dentinal tubuli and the apical foramina hermetically against bacterial invasion, and (9), if possible, it should offer some resistance to the Roentgen rays so as to furnish an opaque shadow picture. To enumerate all the substances which have been advocated at one time or another as root-filling materials and to criticize their respective usefulness is entirely outside of the scope of this paper. Merely to mention the most important groups of materials, we may state that silk or cotton, either raw or purified, medicated or carbonized, asbestos, the cements, metals in the form of wire, foil, or amalgams, gutta-percha in its pure form or in its many modifications, wood points, semisolid pastes, principally composed of zinc oxid combined with various antiseptics, and certain diverse substances—*i.e.* salol, paraffin, waxes, resinous compounds, balsams, etc.—have been used with more or less success. Clinical observations and laboratory experiments have demonstrated that out of this great mass of suggested materials only a very few substances comply with the above demands.

Silk and cotton, in their pure state or in their many modifications, have always been failures as root-filling materials. Among the various cements the zinc oxychlorid has been the most successful compound, and such skilled operators as Jenkins, E. Kells, Jr., Ottolengui, and others, recommend it as being practically the most suitable material for this purpose. In general, the introduction of cements into tortuous canals is very difficult; they are irritants if forced beyond the foramen, and their complete removal from a root-canal is often impossible. Metals, on account of their imperfect adaptation and natural resistance to manipulation in the minute canals, have been practically discarded. Gutta-percha, in the form of cones, in conjunction with its solution in chloroform or some of the essential oils, and covered with zinc chlorid cement, as Webster(2) and Cook(3) have shown experimentally, is practically moisture-proof, and will to some extent prevent the ingress of bacteria. Cook(4) is rather partial to a chloro-percha solution, claiming that a slow liberation of active chlorin, which acts as a powerful antiseptic, takes place in a root-canal filled with this compound, while other practitioners prefer a solution of gutta-percha in eucalyptol or in any one of its isomers, *i.e.* cajuputol, myrtol, cineol, etc. Laboratory tests made with these compounds in glass tubes and in extracted teeth have demonstrated that, in certain cases, a watertight filling can be made. At various times test fillings have been made with the gutta-percha preparations before societies, and it was invariably found that less than 50 per cent. of the fillings could be called "good" root-fillings. Gutta-percha, in its many modifications or combined with the cements, is principally employed in the United States and Canada as a root-filling material, while in Europe semisolid pastes are at present highly valued for such purposes. Experimental work with the latter compounds has proved that they are valueless, since they prevent the ingress of moisture only temporarily. Wood points, artificially prepared or in the form of natural thorns or as charcoal points, are porous, and consequently are useless substances. Salol, when melted into a root-canal, will be absorbed within a short time. Some of the balsams—*i.e.* Canada balsam, balsam of Peru, balsamo del deserto, concentrated solutions of sandarac, and other resinous compounds—are still lauded by many practitioners, especially balsam of Peru, which has lately been recommended again. The solid resins possess many advantages over other compounds; their successful introduction into fine root-canals, however, is very difficult. Of the various waxes, the insoluble hard paraffin has given most excellent results, and it is with this last substance that the following discussion is concerned.

HISTORY OF THE FILLING OF ROOT-CANALS WITH PARAFFIN.

The solid and liquid paraffins occupy quite an important place in the various branches of medicine. In dermatology, they are principally employed as vehicles for heavy metallic salts and oxidizing substances, in the preparation of ointments, and for subcutaneous injections. During 1891–96, Corning of New York published a series of articles in which he advocated the hypodermic injection of paraffin for surgical purposes. Gersuny of Vienna, in 1900, employed paraffin for prosthetic purposes, especially for the correction of facial deformities. Since then an extensive literature on the use of paraffin for such or similar procedures has appeared. About 1883 paraffin was recommended as a root-filling material. It is quite difficult to state who first advocated it for this purpose; most likely, however, we are indebted to Charles S. Tomes(5) for its introduction. In 1883 he presented a paper before the Odontological Society of Great Britain(6) entitled "Note Upon a Method of Filling Root-canals." Tomes' communication is of such vital interest to the full comprehension of the subject under consideration that we have here incorporated the following extract from his original presentation:

> There are certain qualities which a perfect root-filling material should possess, which cannot be said to be united in any one material in use for the purpose. It has lately occurred to me that amongst the varieties of solid paraffin, such as is used for embedding tissue for the purpose of cutting microscopical sections, a perfectly indifferent substance of any required melting-point could be found, and that if one which melts at but little above the temperature of the body be selected, it would be easy to introduce it in a fluid condition. If a hypodermic syringe be filled with such a paraffin, to which two or three drops of carbolic acid have been added, it will be found easy to introduce the nozzle of the syringe a little way up the root-canal, the syringe having been moderately heated; when the piston is pressed, the liquid paraffin will of itself run a good way along the previously dried root. An excess having been left in the pulp chamber and cavity of decay, a heated Donaldson's nerve bristle worked up and down the canal will soon carry the paraffin to the very end of almost any root, and it can be kept fluid in the tooth either by touches of a hot instrument or by blowing at it with a hot-air syringe. The root may be filled entirely with paraffin, or filaments of wood, or even threads of cotton wool, may be passed up into the melted paraffin; probably the introduction of fine fibers of wool will be found to be an advantage in most cases, or fine wire may be substituted for the wool. So far I have had every reason to be satisfied with the results.

In the same year—1883—there appeared a communication in the *Journal of the British Dental Association* on the same subject by G. J. Hutchinson, without, however, offering any new suggestion. From then on sporadic reports may be found in the various journals, for instance from 1894 to 1897 the DENTAL COSMOS published several notices on the use of paraffin by Kirk, Gibbs, de Souza, etc., in its pure state or in combination with aristol, salol, and other substances for root-filling purposes. In 1899, Ziegler, in the *Ohio Dental Journal,* refers to it in an article on "Treatment of Deciduous Teeth." From 1891 to 1893, E. T. Gramm(7) of Chicago, demonstrated and discussed paraffin root-fillings before various local and state societies in Illinois, Missouri, and Iowa. He advocated base-plate paraffin in conjunction with copper points, the technique being about the same as outlined by Tomes. An interesting article on the use of paraffin as a root-filling material in teeth with undeveloped roots, by Trauner(8), appeared in 1902. Trauner employed a very small syringe, known as Boehm's syringe, for injecting the liquefied paraffin in the root-canals of the upper teeth, and a heated platinum needle for conveying it into the root-canals of the lower teeth. Eckstein(9) in the same year advocated an antiseptic paraffin compound consisting of paraffin, phenol, oil of bergamot, and potassium iodid. Again, Luniatscheck(10) in 1905 lauds the use of paraffin as a root-filling very highly. He advises the use of the Evans root-dryer as a filling instrument for such purposes. Within recent years Dunning(11) of New York, has repeatedly called attention to the excellent qualities of paraffin as a root-filling material. Lately he advocates the use of a mixture consisting of 4 parts of paraffin, 4 parts of bismuth subnitrate, and 1 part of paraform. He places a point, resembling a gutta-percha cone, made of this mixture into the dry root-canal, and melts it into place by means of a copper wire heated electrically. To remove all of the air, especially in upper teeth, he often passes a solid gutta-percha point directly through the paraffin mixture, leaving the point in place. Dunning demonstrated his method at various intervals before the eastern societies, and, judging from the published reports, it seems that his procedure met with general favor, but apparently has not come into general use. In 1909, Szabo(12) published a most excellent article on some experimental work with various root-filling compounds which he carried out in the university of Budapest. From an extended series of experimental tests, in which the more important root-filling materials were employed, he found that paraffin is superior in every respect to any of the other substances used. In the last few years a number of other publications have appeared, notably those of Barthelmae(13), Reisenfeld(14), Rumpel(15), and others, which are principally concerned with the technique of paraffin root-canal filling, and less so with experimental work.

CHEMISTRY OF PARAFFIN.

Paraffin, also known as hard paraffin, paraffin wax, solid paraffin, *paraffinum durum,* is, according to the U. S. P.—"A mixture of solid hydrocarbons, chiefly of the methane series, usually obtained by chilling and pressing the distillates from petroleum having high boiling-points, and purifying the solid pressed cake so obtained." The name paraffin was given to this substance by its discoverer, Reichenbach, who in 1830 obtained it among the products of dry distillation of beech-wood. At present, it is usually obtained by purifying the waxy substance produced by distillation from petroleum or bituminous shales, or from natural deposits known as ozocerite—earth or mineral wax.

Chemically, the paraffins correspond to the general formula $C^nH_2{}^n+2$; the ultimate analysis yielding about 85 per cent. carbon and 15 per cent. hydrogen. Purified hard paraffin is a neutral, white, inodorous, and tasteless substance, having a micro-crystalline waxy appearance with a specific gravity ranging from about 0.840 to 0.918. It is insoluble in water and indifferent to the strongest acids, alkalies and oxidizing substances, hence its name, *parum affinis*—of little affinity. Chloroform, carbon bisulfid, gasolene, xylol, ether, oil of turpentine, olive oil, and, to a very limited extent, warm alcohol will dissolve it. When melted, it may be readily mixed in any porportion with fats, waxes, stearin, oils, and resins. The melting-point of paraffin is variable; it depends largely upon the origin of the material. The so-called soft paraffin, also known as petrolatum, vaselin, cosmolin, and by many other trade names, melts at from 40 to 42° C. (104 to 108° F.), while the melting-point of the hard paraffins ranges from 45 to 80° C. (113 to 176° F.). Ceresin, the hardest of the paraffin series, has the highest melting-point, viz, about 80° C. (176° F.). When heated to about 300° C. (456° F.) it is volatilized without leaving a residue. Technically, paraffin is very largely used in the manufacture of candles and lubricating mixtures, as a preservative for meats, eggs, etc., and for waterproofing wood, paper, and other materials. It is also used in large quantities as a base for chewing-gum, for cheap candies, coating pills, etc.

THE THERAPEUTICS OF THE PARAFFIN ROOT-FILLING COMPOUND.

Paraffin as a root-canal filling was introduced, as we have stated above, about 1883. In spite of its many advantages over other substances employed for such purposes, it has not come into general use. The reasons for this apparent neglect may be largely attributed to faulty technique, to the wrong kind of paraffin, and to the fact that the paraffin filling, in certain cases, will disappear from the root-canal after a more or less prolonged period of time. Charles Tomes, Trauner, Rhein, Gramm, Dunning, and others have called attention to this latter fact, and we personally have had occasion to observe it in two instances. However, most observers agree that root-canals from which the paraffin had been absorbed were always found to be free from infection. The disappearing of the root-filling is the point most vigorously objected to by those who have used it; if it can be overcome, paraffin seems to be the most suitable material for root-filling purposes, or, expressed in the words of a professional friend: "Prove to me that this danger does not exist, and I shall be a most enthusiastic advocate of it." To explain this phenomenon, we believe with Charles Tomes that the ordinary paraffins, *i.e.* those having a melting-point of less than 45° C. (113° F.), and the so-called base-plate paraffin combinations, which have been principally used for this purpose in former years, become absorbed by the tooth structure. If there should have been present a comparatively large foramen, some of the soft paraffin may have become displaced by ingrowing tissue. These deductions are in conformity with the results obtained by experimental work. If we place a tooth with an open, empty root-canal in melted soft paraffin, stained with an anilin dye, and keep it for some time at body temperature in an incubator, we find on splitting the tooth that its tubules are filled with the colored paraffin. On the other hand, the hard paraffin, *i.e.* that which melts above 55° C. (131° F.), when subjected to the same treatment, is *not* absorbed into the tooth structure. If the high-melting paraffin is previously dissolved in xylol, and a tooth-root is kept in this solution for a few days at body heat, its tubules also become filled with the solution. The changes which occur in the structure of paraffins of diverse melting-points when injected into living soft tissues verify this fact.* For these various reasons, *it is imperative that the paraffin which is used for root-filling purposes must have a melting-point of not less than 55° C. (132° F.).* Much higher melting paraffins offer no advantages; the high heat which is required for their liquefaction may cause injury to the soft tissues about the foramen, and the necessarily highly heated instruments are a constant source of danger to the patient and the operator. From our experimental work we have found that what is commercially known as "hard paraffin," with a melting-point of from 56 to 58° C. (133 to 136° F.), gives the most satisfactory results. Since the correct melting-point of the paraffin used for this work is of the utmost importance, it is invariably necessary to determine the melting-point of every lot of paraffin used for this purpose.

Since paraffin is colorless, it is of advantage to incorporate some dye material which, however, must not stain the tooth structure. Incidentally, as Dunning has pointed out, this added substance should give "body" to the paraffin, and it should make the paraffin plug fairly impermeable to the X rays. Bismuth subnitrate, which is largely used for X-ray work in medicine and surgery, has been recommended by Dunning as an admixture to the extent of about 45 per cent. Such large quantities destroy the normal cohesion of the paraffin molecules; it becomes what is technically known as "short." Furthermore, bismuth subnitrate is too bulky, and is readily decomposed by high heat; therefore it is not suited for combining with a high-melting paraffin. We have experimented with a large number of metallic compounds and with pure metals in an extremely fine state of division. Merely to mention a few of the substances experimentally employed, we name the various bismuth salts, mercury sulfid (vermilion), hydrated iron oxid (crocus martis), zinc oxid, zirconium oxid, powdered lead, zinc, bismuth, electrically reduced metals, etc. We have finally found in the anhydrous bismuth oxid, Bi_2O_3, also known as bismuth trioxid, a substance which is well adapted for this purpose. Anhydrous bismuth oxid contains about 90 per cent. of metallic bismuth, while the subnitrate contains only about 72 per cent., hence the greater resistance of the former substance to the Roentgen rays. If 30 per cent. of a dry, finely powdered bismuth oxid is added to the liquefied hard paraffin, a smooth compound of a dull lemon-yellow color is obtained, which produces a distinct shadow picture when it is viewed with the fluoroscope.

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*For the determination of the melting-point of paraffin, various methods are in vogue. The following two procedures have been selected on account of their simplicity:

(1) A small beaker, about 3 inches high and 1½ inch in diameter, is filled to about 1 inch from its top with distilled water and heated to about 75° C. (167° F.). The heat is shut off, and a piece of the paraffin of about the size of a small pea is dropped on the hot water where it will melt in a few moments, forming a thin, transparent layer on top of the water. A thermometer is then carefully lowered into the water, until the mercury bulb is completely surrounded by it. At the very moment that a thin, solid film of paraffin is formed, the scale is read. This is the point at which the paraffin solidifies or, respectively, melts. During the observation, the thermometer and the beaker must be carefully guarded against draft of any kind.

(2) The paraffin is carefully melted in a beaker, and a capillary tube is dipped into the liquid paraffin, and, when it is filled, one end of the tube is sealed in the flame. The tube is now put aside in a cool place for from 3 to 5 hours. At the expiration of this time, the tube is tied to the bulb of a delicate thermometer, the length of the tube being the same as the thermometer bulb. The thermometer and the attached paraffin tube are placed in water, and gently warmed until the capillary column of paraffin becomes transparent. At this moment, the thermometric reading is made which indicates the melting-point of the paraffin.

The addition of antiseptics to insoluble substances, *i.e.* high-melting paraffin, gutta-percha, etc., which are used as root-filling materials, has practically very little value. Theoretically, at least, it seems improbable, since antiseptic action means becoming soluble, or, to speak more correctly, the drug has to undergo ionization in the medium with which it is surrounded. We should remember that the pharmacologic action of a drug is manifested only when this drug enters the tissues as a liquid or in gas form. When a solid drug is introduced, it necessarily follows, as we pointed out, that it must be soluble in the tissue fluids, if its typical action is to be manifested. Since hard paraffin, gutta-percha, and other similar substances are insoluble in the body juices, they prevent the solution of the drug or drugs which are dissolved in or mixed with them. If the insoluble root-filling material, such as cotton, wooden points, various cements, semi-solid pastes, etc., contains a soluble antiseptic, but offers no resistance to the invading surrounding fluids, it will be exhausted in due time. This statement is sufficiently substantiated by clinical observation and experimental work. Inoculated plate cultures in which cones of sterile hard paraffin containing reasonable quantities of thymol, mercuric bichlorid, bismuth oxid, iodoform, etc., are suspended, show a more or less tiny zone of inhibition of bacterial growth within their immediate periphery. This is an indication that some of the antiseptic material deposited upon their surface has entered into a solution. But these small quantities of the antiseptic are too minute to be regarded as being of permanent value. No bacterial growth is observed upon the suspended pure sterile paraffin cones. The ordinary molds, however, will grow on paraffin. If we wish to cover a root-canal with a powerful antiseptic, it seems more reasonable to apply this antiseptic separately or dissolved in a volatile medium prior to the insertion of the final root-filling.

Of the many powerful antiseptics possessing a relatively permanent action, comparatively few answer our purpose. A normally liquid antiseptic is not as well suited as one which can be deposited in dry form, and which is slowly dissolved in the moisture present in the dentinal tubuli. Thymol dissolved in acetone answers the purpose well. It should be borne in mind that no fluid substance will enter the dentinal tubuli of a tooth-root *in situ* at once, because of the moisture present; it requires a more or less prolonged period—days and weeks—to accomplish this osmotic interchange, and it should also be remembered that experiments regarding the penetrability of antiseptics made with tooth-roots out of the mouth do not represent normal conditions, and are therefore misleading. From experimental work we are led to believe that acetone is a fluid which is especially suited as a carrying medium on account of its ready affinity for water, its solvent action upon fatty substances, its penetrating power, its hardening effect on tissues, and its ready vaporization. Acetone, also known as pyroacetic spirit, is a colorless, mobile, and volatile liquid having a characteristic etherial odor and a pungent sweetish taste. It volatilizes at a low temperature, and boils at about 56° C. (133° F.). It is readily soluble in water, alcohol, ether, chloroform and the volatile oils. It is inflammable, and burns with a luminous, non-sooty flame.

We again emphasize that, according to our conception, the object of a root-canal filling is to seal hermetically the foramina and the tubuli with a solid, inert, and unchangeable substance. The mechanical obliteration of the canal we wish to emphasize especially, as it offers the only rational solution of the question under consideration. This dictum holds good for all classes of root-canals, and it does not matter whether the canal is normally sterile or whether it has been once infected. In the latter case, the sealing of the dentinal tubuli is of paramount importance, since reinfection of a root-canal is probably always due to those micro-organisms which have lodged in the dentinal tubuli, and which cannot be destroyed by surface disinfection. The classic experimental work of Mayrhofer, Baumgartner, and others has demonstrated that reinfection of a root-canal occurs in this manner, notwithstanding the purely theoretical claims made by certain writers who maintain that complete sterilization of infected tooth structure can be readily accomplished with specific germicidal mixtures. Infectious material may be obtained at any time from a so-called sterilized tooth, and when placed in nutrient material will almost always show a luxuriant growth of pathogenic micro-organisms. Mayrhofer(16) has pointed out that such drugs as oil of cassia, oil of cloves, the cresol-formalin mixture, iodoform, etc., do not sterilize a root-canal permanently. He has further demonstrated, moreover, that even the much-lauded cresol-formalin mixture, when employed as a root-canal disinfectant, does not prevent—within eight weeks—the reinfection of 90 per cent. of the previously sterile canals. We still adhere to the dogmatic axiom that an incipiently infected root-canal of a tooth *in situ* may be rendered aseptic by the use of antiseptics, but it is impossible to sterilize the entire tooth structure. To sterilize an infected tooth-root, basing our conception upon our present knowledge of antiseptics, means to remove it bodily and to thoroughly boil it.

Paraffin is a compound which is inert in regard to the action and growth of bacteria; it has no antiseptic action in itself, and it can be readily sterilized by heat. As we stated above, it is largely used in the industries as a successful preservative for perishable substances, and experimentally it has been demonstrated that a paraffin solution—in xylol, for instance—will mechanically inhibit the progress of dental caries. This latter process is too cumbersome, however, to be of practical value. To be on the safe side, as far as asepsis of the prepared cones is concerned, we add to the liquefied paraffin compound 2 per cent. of thymol; the latter is readily soluble in the paraffin. Any other soluble antiseptic, preferably of the aromatic series, may be used instead.

To more readily comprehend this most important question of reinfection, let us digress for a moment from the subject under consideration, and recall to our minds the *modus operandi* as it occurs in devitalized teeth. The body of the tooth, the dentin, is traversed by the dentinal tubuli, which number from 25,000 to 30,000 to the square millimeter. The pulp *in situ* sends protoplasmic processes into these tubuli, and is connected with the peripheral tissues by arteries, veins, and nerves, which pass through the main foramen and a number of small foramina—usually from three to seven—present in the tooth apex. According to a recent investigation by Fischer(17), these accessory foramina are found in about 90 per cent. of all permanent teeth. These anatomic facts are not sufficiently emphasized at present; they are, however, of great importance for the full comprehension of the pathology of secondary infection. In an incipiently infected root-canal, these dentinal tubuli and the small foramina offer ready hiding-places for the various forms of pathogenic bacteria. After exhausting the nutrient material, the bacteria become attenuated, or they may assume resting forms. If the tubuli and the foramina are tightly sealed, these inclosed bacteria must necessarily remain permanently confined in their lodging-places, while if the root-filling leaks, the seepage of serum furnishes fresh nutrient material, which offers excellent opportunities for their renewed activities. By continuity this secondary infection spreads along the line of least resistance, *i.e.* toward the apex, and finally reaches the pericementum. This tissue protects itself against the invading foe by a vital response, *i.e.* a reactive inflammation which results in the production of a fungous growth, known as a granuloma, or, in the past, as the abscess sac, or the pyogenic membrane. The granuloma is occasionally the starting-point of a radicular cyst. For years the inclosed bacteria may remain dormant. At the slightest provocation, however, it may be by overexertion, a cold, increased blood pressure, lowered vitality, or some other exciting cause, they may assume a most virulent activity, resulting in the production of the so-called subacute abscess. Relying on this supposition, we are able to furnish a plausible explanation of how these obscure secondary abscesses occur about those devitalized teeth which at one time were pronounced cured. This conception is in accordance with similar pathologic disturbances as observed about old tubercular foci, bone lesions, etc.

PREPARATION OF THE PARAFFIN ROOT-FILLING COMPOUND.

The formula of the paraffin root compound reads as follows:

Thymol,	2 parts.
Bismuth trioxid,	30 "
Hard paraffin—melting-point, from 56 to 58° C. (133 to 136° F.)	68 "

Commercial paraffin contains many impurities, principally soluble chlorids and sulfates, water, and mechanical admixtures. For purification the paraffin is placed in a vessel containing water, and boiled for about half an hour under constant stirring. After cooling, the cake of paraffin is removed, its lower part, which contains the insoluble impurities, is cut away, and the process of boiling in fresh water is repeated. After the second cooling, the paraffin cake is thoroughly dried and placed in a porcelain capsule and heated to about 120° C. (248° F.), and kept at this temperature for about half an hour. This heat removes the small quantities of water present and incidentally sterilizes the paraffin. It is then removed from the fire, filtered through cotton cloth, and slightly cooled off. Under constant stirring, the thymol is added and after this has dissolved, the previously dried powdered bismuth trioxid is incorporated. After the mixture becomes solid, it is slowly remelted in a water-bath, well stirred, and cast into suitable molds.

EXPERIMENTAL WORK.

When pure sterile paraffin is injected into the human body with ordinary precautions, it is tolerated by the tissues without further reaction, provided that the injected quantity is within reasonable limits—about 2 to 3 grams to the dose. This statement is sufficiently substantiated by the rather extensive use of paraffin for prosthetic purposes in surgical practice. The same is true of the paraffin compound as suggested by us for the filling of root-canals. To verify this assertion, injections were made into the loose areolar tissue under the skin of rabbits. The primary object of these experiments was to determine whether the tissues would tolerate the paraffin compounds equally as well as the pure paraffin. At various intervals, doses of about 1 gram (15 gr.) of soft and hard paraffin and of the paraffin root-filling compounds were injected. The rabbits were anesthetized, and these substances were introduced in a semi-liquid state by means of a heated syringe. Very soon after the injection the substances solidified, and could be clearly outlined by the touch of the finger. By testing the rabbits at various periods, the paraffin deposits could always be clearly felt by the palpating finger; no change seemed to have taken place. After the expiration of respectively 2½, 4, 5, and 6 months, the paraffin tumors were removed under an anesthetic. The hard paraffin deposits were sharply outlined, but they were embedded in a dense capsule of tissue. By careful dissection, the deposits with their adhering connective capsules were removed. The largest of the paraffin compound deposits measured 18 x 13 x 5 millimeters, and weighed 0.8 grams (12½ grains). Sections were made to detect any changes in the structure of the compounds.*

It was observed that the bodies of the hard paraffin compounds were intact, the capsules adhering closely to the outer surfaces and filling every crevice of the paraffin plugs. The various colored compounds were not altered in the least, which indicated that the tissue fluids had not exercised any solvent action. The paraffin compounds contained various percentages—from 10 to 30—of hydrated iron oxid or bismuth trioxid. These observations are in conformity with the results obtained by Gersuny, Moskowicz, Stein(18) and others who have experimented with hard paraffin. It may be interesting to know how this process of incapsulation takes place. According to the researches of Marchand, a sterile foreign body, when introduced into the living animal tissue and left there for a certain length of time, produces a series of changes which are generically known as reactive inflammation. The wandering of the leucocytes, the exudation of serum, and the proliferation of the cells of the ground substance which finally organize into permanent tissue are the typical successive expressions of the irritation brought about by the foreign body, ultimately resulting in its incapsulation. If we compare these findings as observed on comparatively large quantities of paraffin with the rather small amounts which accidentally may pass beyond the foramen of a root-canal in an attempt to fill it, we are reasonably certain that they will be retained permanently by the tissues without the slightest disturbance. When the semi-liquefied paraffin compound is forced beyond the foramen, it molds itself about the end of the tooth and, on congealing, forms a solid cap over its apex. For this reason, hard paraffin is the most satisfactory canal-filling material in all cases where an open foramen, an incompletely calcified root, or a perforation of the root is present.

When soft paraffin is injected into the tissue, the changes which occur differ markedly from the above observations. The soft paraffins, *i.e.* those which melt below 42° C. (106° F.), are also incapsulated, but the connective tissue fibers grow through the entire mass in all directions, and in due time, as has been stated by Eckstein, Delangre, Ligoric, and others, this semi-organized paraffin becomes absorbed (and decomposed?) through the action of the leucocytes (ferments?). The present extensive use in surgery and dentistry of Beck's bismuth paste(19), which contains approximately 70 per cent. of soft paraffin, furnishes excellent proofs of this process of absorption. Not alone does the paraffin become absorbed, but the tissue fluids dissolve the otherwise insoluble bismuth subnitrate, and, as a consequence, severe bismuth poisoning has been observed in some cases. Hence, *we emphasize again that a paraffin which is used as a root-filling material must have a melting-point above 55° C.—131° F.*

To test the impermeability of paraffin to water, innumerable tests were made. Thick-walled glass tubing—drawn out to capillary points—and extracted teeth were used in connection with various colored fluids, principally methylene-blue solutions. When glass tubing is used for experimental work, its expansion and contraction under heat must be taken into consideration. It is quite unnecessary to describe the various tests in detail, but in order to mention merely a few, the following are cited: Glass tubes, of about

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* For thin sections, the tumor is best embedded in celloidin; for thick sections, low-fusing paraffin is to be preferred.

¼ inch in diameter and 6 inches long, were drawn out to fine points so as to resemble a much enlarged root-canal. These tubes, from the point up, were partially filled with melted paraffin or the paraffin root-filling compounds, and the balance with the anilin solution. The tubes, with their points down, were then suspended in test tubes filled with plain water. In another series of tests, the upper part of the charged glass tubes was filled with plain water, and then immersed into colored fluids. In all instances, provided the necessary technical details were observed, a watertight plug was produced by the paraffins; no leakage could be noticed. At the junction of the paraffin and the colored fluid a slight discoloration in the center of the paraffin could be observed, which indicated the contraction of the paraffin in hardening. It is important to observe that this contraction occurs only in the center of the paraffin cone at its thickest part. Again, teeth the root-canals of which were filled with the paraffin compound were cemented into glass tubes, the unprotected roots reaching into the tubes. These tubes were about 30 inches long, and were filled with the anilin solution. After weeks of observation, no leakage could be observed. Again, teeth the roots of which were filled in the above manner were kept in an anilin solution, and after intervals of days and weeks were ground down to the root-filling; no leakage could be observed. The results of these various tests merely indicate that the paraffin or paraffin compound, when melted into a root-canal *lege artis,* forms an absolute watertight plug.

To ascertain the adaptability of paraffin compounds to the walls of root-canals, the canals were prepared in the routine manner and filled with the paraffin compounds. The teeth were then placed in a 50 per cent. solution of hydrochloric acid, and set aside in a warm place. The acid has to be renewed every day. Usually, within from three to five days the entire tooth substance is completely destroyed. The remaining root-fillings are washed in water and kept in a dish filled with the same fluid. The root-fillings float on the water, and may be readily studied with a magnifying lens. Great care is required in handling these delicate paraffin castings, as they will easily break. The root-fillings present a perfect plastic picture of all the irregularities of the root-canals. The paraffin compounds had flowed into all ramifications and irregularities of the canals; even the fine bur markings near the entrance of the canals could be observed. In studying these casts, it was noticed that the irregularity of the anatomic structure of the root-canals occurred with an astonishing regularity. In one case we were fortunate enough to obtain the roots of a lower left first molar of a boy of fourteen years which had been filled with the paraffin compound by a student in our infirmary. The tooth remained intact in the mouth for 9 months and 9 days. Its cement filling was lost and the boy returned. It was deemed best to have the broken-down tooth removed; the roots were carefully ground down, and showed perfect root-fillings without the slightest sign of absorption. In a few cases we had the opportunity to fill the root-canals of teeth doomed to extraction with the paraffin compound before their removal. They were subjected to the above treatment, and the results obtained were always satisfactory, *i.e.* the canals were completely filled to the point where the hot wire had reached.

Regarding the relationship of pathogenic bacteria to hard paraffin, we have stated above that the latter has no influence on the growth of these organisms, and that it does not furnish a suitable nutrient medium for their further development. Paraffin is a hydrocarbon—*not* a fat—and consequently it is not subject to putrefaction. To test the hard paraffin in regard to the permeability by bacteria, we employed the same procedures as outlined by Webster, Cook, and Szabo. The apparatus employed corresponds to the one used in the tests for the permeability of paraffin fluids. The sterile glass tubes were partially filled with the paraffin compound, virulent cultures of pus organisms were added, and the tubes closed with cotton. The charged tubes were dipped in sterile bouillon, and placed in an incubator. Within a week's time no growth was noticed. From a large number of observations we are forced to conclude that the paraffin root-filling compound is impermeable to bacterial growth.

In using the paraffin compound, or, in fact, any other material for the filling of root-canals, the question is often asked—What becomes of the air if it is forced beyond the foramen in filling a canal? This small amount of air, when forced beyond the foramen, will be taken care of by the soft tissues, and, since it is not forced into a bloodvessel, no danger from air-embolism is to be expected. That such small quantities of air, even if injected into a vessel, are absolutely free from danger, has recently been demonstrated experimentally by Blair and McGuigan(21).

TECHNIQUE OF FILLING ROOT-CANALS WITH THE PARAFFIN COMPOUND.

The *sine qua non* of a successful paraffin root-canal filling is an absolutely dry root-canal. To accomplish this end, certain physical procedures are in vogue, *i.e.* the hot-air blast, the electrically heated root-dryer, the heated wire—of which the Evans root-dryer probably is the best-known prototype—bibulous paper cones, cotton, etc. To facilitate the removal of moisture, hygroscopic chemicals, *i.e.* alcohol, chloroform, ether, and other substances are often used in conjunction with the above-enumerated means. These compounds, with the exception of alcohol, have little affinity for water, hence are of no practical value. As we have stated above, acetone is well suited for this purpose. In drying out a root-canal, it should be borne in mind that the removal of its natural moisture or any fluid placed within it is well-nigh impossible, with the much lauded hot-air blast, if its foramen is closed. A few trials on an extracted tooth or a glass tube drawn out to a fine solid point and filled with water or any other of the above-enumerated fluids, will readily convince one of this illusory conception. The fluid will move back and forth upon the elastic cushion of air confined in the end of the tooth or the tube, or, if no air be present, the heated air-blast will practically make no impression on the moisture column. The removal of the moisture is usually best accomplished by using bibulous paper cones in conjunction with the heated metallic root-canal dryer. The cessation of the hissing sound following the introduction of the hot wire indicates that the desired effect has been successfully achieved. In passing, it is well to remember that overdrying of the tooth structure is a dangerous procedure. If more or less of the water which holds the gelatinous matrix of the tooth in colloidal solution is removed by overheating, that tooth is proportionally weakened against physical or chemical insults. Black, Cook, and others have repeatedly called attention to this fact, and it is well borne out by clinical observation.

After the root-canal is freed from its moisture, it is flooded with acetone, and dried again with the hot wire point. The object of this procedure is to remove every particle of moisture from obscure nooks. When a root-canal which is kept continuously moist with a most annoying, persistent seepage is thoroughly dried out with acetone and the heated root-dryer, the seepage will usually stop immediately. A wisp of cotton wrapped about a broach and dipped in pure paraffin oil—also known by many trade names, such as liquid albolene, cosmolin, oliphane, etc.—is now passed into the dry root-canal and immediately followed by the hot compressed-air blast, so as to uniformly coat the canal. The object of this procedure is to cover every accessible surface with a thin film of oil, which, in turn, facilitates the ready flow of the liquefied paraffin compound into every available space. Too much oil must be carefully avoided. This lubricating of the canal constitutes an important factor in the correct technique of the paraffin root-filling method. A cone of the prepared paraffin is now inserted into the canal, and the heated root-dryer passed along its side. By a gentle pumping motion, the air is expelled and the semi-liquefied paraffin is allowed to flow into the canal. The film of the previously introduced paraffin oil and the semi-liquefied paraffin compound possess great affinity for each other, and wherever the oil film has been deposited, the paraffin compound will readily flow. Care should be exercised not to overheat the paraffin compound. It is essential, however, to keep the root-dryer fairly warm, so as not to chill the semi-liquefied paraffin when the dryer reaches the deeper portions of the canal. As the paraffin compound melts at less than 60° C. (140° F.), there is no danger of burning the patient with it. Sufficient paraffin compound is now added so as to completely fill the canal. It has been suggested to insert finally a gutta-percha cone or a heated copper wire into the filled canal, and leave it permanently in place. Such procedures insure a more perfect filling; they overcome to some extent the shrinkage of the paraffin in solidifying. Gutta-percha cones as suggested by Dunning are especially well suited for this purpose; they act as a core, and insure a more perfect adaptation of the softened paraffin to the irregularities of the root-canal. In using these cones, their extreme points are first cut off, and they are then quickly pressed in the semi-liquid paraffin. Fine copper wires are readily obtained for such use by cutting suitable pieces from an electric-light cord. On the congealing of the paraffin compound, a slight depression in the center of the filling near the entrance of the root-canal will be noticed. This contraction is in conformity with the natural tendency in the hardening of the paraffin, which will always congeal from the periphery toward the center, and it thereby insures an unchangeable, permanent, and absolute watertight sealing of the canal walls. The paraffin compound is finally covered with a layer of oxychlorid or oxyphosphate cement to form a solid foundation for the future permanent filling. If it should become necessary at some future time to remove the root-canal filling, the introduction of the heated wire will readily liquefy it; it can then be removed with bibulous paper cones, the broach, and, if necessary, with a solvent, *i.e.* xylol.

The position of the patient in filling the root-canals of teeth in the lower jaw is self-explanatory; in filling the canals of the upper teeth, the chair is tilted backward, so as to obtain a horizontal position of the upper teeth. As capillary attraction plays an important rôle in this procedure, the paraffin compound will readily follow the heated wire.

Regarding the instruments used as root pluggers for this work, any wire which will retain heat sufficiently long to melt the paraffin, and which can be filed to a point fine enough to reach the smallest canals, is suitable for this purpose. Silver or copper or an alloy thereof are good heat-conductors, and therefore the most suitable metals. A one-inch coil made of No. 10 or No. 12 copper wire, with a three-inch extension, filed to a fine point, answers the purpose fairly well; the Evans root-canal dryer, with its silver point, is also very useful, though the best results are obtained with the electrically heated point. That the heat can be perfectly gaged in the latter appliance at once characterizes its superiority over the other instruments. The fine point of the root-canal plugger must be able to carry a minimum temperature of 60° C. (140° F.).

BRIEF RECAPITULATION.

In recapitulating the technique of root-canal filling with the paraffin compound, the following points are the most important factors, which must be rigidly observed: Carefully drying out the root-canals; lubricating the canal walls with a thin film of paraffin oil; filling the canals with the prepared paraffin compound by means of a heated wire, using a pumping motion, and covering the finished root-filling with a layer of cement.

During the last two years, the improved paraffin compound has been used extensively as a root-filling material in our infirmary and by a number of practitioners. So far, the results obtained have been exceedingly gratifying, and we now take this opportunity of offering the material and the technique of its application to the profession at large for further trials.

Résumé—Improved Paraffin Compound.

Hard paraffin, having a melting-point of from 56 to 58° C. (133 to 136° F.) with the addition of 30 per cent. of bismuth trioxid and 2 per cent. of thymol, possesses the following qualities as a root-canal filling material:

(1) It is non-putrefactive.

(2) It is sterile and slightly antiseptic.

(3) It is easily introduced.

(4) It is absolutely non-irritating to the soft tissues; when forced beyond the foramen of a deciduous or permanent tooth or through a perforated root, it is borne by the soft tissues without the slightest reaction.

(5) It does not discolor the tooth structure; it possesses a distinct yellow tint, which makes it readily discernible to the eye.

(6) It is non-porous and unchangeable; it produces an absolutely permanent and watertight filling.

(7) It is easily removed.

(8) It will seal hermetically the dentinal tubuli and the foramina against bacterial invasion.

(9) It is opaque to the Roentgen rays.

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ATROPHIC ALVEOLITIS.

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(Read before the Susquehanna Dental Association of Pennsylvania, at its forty-ninth annual meeting, Wilkes-Barre, May 21 to 23, 1912.)

THAT which is here submitted represents the fruits of more than twenty years of careful and critical observation of the effect and of sincere effort to trace the cause of the disease known as pyorrhea alveolaris. I desire very particularly to emphasize what has seemed to me, after most careful deduction, to be the chief factor in the disease under discussion, *i.e.* impaired nutrition.

While other elements may contribute their quota—such as lack of hygiene, whether general or local, diet, the idiosyncrasies of certain individuals in regard to certain foodstuffs, constitutional weaknesses, infectious diseases, etc.—I shall not dwell upon these probable contributory causes, but would most earnestly point out for your thoughtful consideration the vital issue—namely, the hygiene of dietetics.

I have been told that to present the subject in this way would suggest a doubt as to my success in surgical procedure: about that, however, we need not be concerned. The thing which is of major importance is that we seek to discover, if possible, the underlying principle in the etiology of this disease, in order to control it in its initial stage.

While I have succeeded for years in restoring the healthy tone of the oral cavity, and may justly claim that the standard of my efficiency is higher from year to year, yet in spite of marked success I have in many instances been compelled to note that, when the patient called again, even at the expiration of a week, mucoid adhesions had again begun to assert themselves. To the thoughtful mind this condition is an evidence of dyscrasia, since, if it were allowed to obtain, the disease would eventually recur; and I am convinced that such adhesions were primarily the exciting cause of the disease, and that they are not dependent upon the local conditions, but are based upon some fault of the natural resistive forces of the body against the entrance and development of micro-organisms.

That I do not stand alone in this deduction may be noted from the following quotation from Dr. F. B. Noyes, on cell activities: "If these centers or cells perform their function correctly, the functions of the body are normal; but if they fail to perform their office, or work abnormally, the functions of the body are perverted." Dr. Black has also arrived at the conclusion that pyorrhea alveolaris is of constitutional origin, from certain experiments and from clinical evidences manifested in his own mouth. Miller, Williams, and Michaels have expressed similar views, and I could cite a number of others who have advanced like theories.

NOMENCLATURE.

The allied causes of this disease I have summed up for myself in a fairly comprehensive term, i.e. *atrophic alveolitis*—for, inadequate as is the nomenclature of this disease, this term seems to cover the subject more fully than any that has been suggested. I am inclined to accept the views of those scientists who assert that our masticating apparatus is in a stage of transition which is tending to make of it a rudimentary organ; and this disease, based upon such an hypothesis, should be called atrophic alveolitis. This term certainly better defines than does any other some of the conditions which come under our observation. One can with deep interest and profit examine the evidences of strong dental organs exhibited in the crania of prehistoric men. Some skulls I once saw appeared to belong to men under fifty years of age, but the morsal surfaces of all the teeth showed great wear, and the maxillary bones indicated great strength. In the mouths of our patients, how frequently do we observe teeth worn away by attrition? We occasionally see teeth that have suffered through erosion or chemical abrasion, but that is not mechanical wear.

ETIOLOGY.

In order to proceed with intelligent sequence with our subject, it is necessary to refer to the perfect physiological relationship of the oral parietes, which indicates that—"The teeth are so perfectly molded and the whole type so perfectly planned before their eruption, that when all the teeth are erupted their approximating facets so adjust themselves as to make of the denture practically one continuous piece of bone, and with the teeth in the opposite jaw they make a truly wonderful mechanical device for the maceration of food. The gingival ligament occupies a place at the base of the crowns of the teeth, and has a firm attachment just beyond the swell of the coronal body and at a point overlapping the enamel, where it joins and overlaps the cementum. The gum completely fills the interdental space, rising higher to overlap the enamel further here, enough to entirely fill the interdental space to the contact points of the teeth."

This arrangement of teeth and gums, when perfect, beautifully fulfils the function for which it was intended. But when even the most perfect physiological types are subjected to the conditions outlined in this paper, we invariably find evidences of perverted function; this, however, need not always manifest itself in the mouth. If, in addition, the continuity or arrangement of either teeth or gum is broken, then recesses occur and conditions are established which, when subjected constantly to bacterial and mechanical irritation, particularly the former, contribute an environment only too favorable to pathological complications; the tissues become inflamed, and the process of dissolution is begun.

It is conceivable that many other conditions could arise to disturb physiological function, such as nervous shocks, protracted physical fatigue, ptomain or chemical poisonings, etc.

TWO PRINCIPAL ETIOLOGICAL FACTORS.

Two principal factors underlie the cause of what we term pyorrhea alveolaris; and, to my mind, all-important as are these great factors, sufficient emphasis has never been laid upon them. The first cause in this process of deterioration is based on nutrition, viz, the habit of *imperfect mastication and over-eating,* which habit is rarely, if ever, overcome. The second cause is the *suppression of the eliminating functions.* Either cause inevitably leads to impairment of cell function.

Imperfect mastication and over-eating I class together, because they are usually synonymous.

Imperfect mastication. The habit of imperfect mastication in infants may be due to circumstances or to ignorance. A teething child is often given food which it cannot masticate with the dentures then in place. Nature has provided a dietary index in the deciduous teeth which is ignored, which circumstance causes the child to bolt its food. Other causes of bolting the food are defective (carious) or malposed teeth which preclude the possibility of proper mastication. Such defective equipment for the proper mastication of food—or, what is equivalent, the pernicious habit of bolting—in time can have but one effect, viz, the perversion of other bodily functions, the lowering of cell resistance, the establishing of chronic invalidism. Some of the early symptoms in children are so-called slight "gastric fevers," adenoids, defected nasal septa, bowel torpidity (chronic constipation) with its added toxic effects, or anything else that can be traced to malnutrition. As a well-known physician has said, "How much chance has the alimentary canal to perform its proper offices when deprived of proper mastication or defecation, or both?"

To eat more food than the system requires is to bring about "hypernutrition." To over-nourish every cell of the body must have as degenerating an influence and probably a more destructive one to proper cell functioning than would be "subnutrition." The latter means starvation—which might redound to the benefit of the cell if correct nutrition be re-established; whereas the former means perverted functional degeneracy, with little hope of restoration to the normal level.

In fact, the only hope ordinarily of restoration to the normal is the swing of the pendulum toward the starvation side, thereby purging the cell and renewing its vitality. During the constructive period large quantities of food may be taken with impunity if properly insalivated, for the violent exercise of youth causes a constant demand for building material which stimulates the sudoriferous system, and the excreting organs are thus able to throw off the waste and impurities which would not otherwise be gotten rid of—for we are so constituted that physical exercise is positively essential to our well-being. The great importance of the sudoriferous system to the human economy is too often not taken into consideration. One of its chief functions is to eliminate waste due to metabolic (cell) changes. If the individual fails to eliminate this waste by perspiration it is carried in the blood stream as a poison. The other eliminating organs of the body make an effort toward throwing it off, but, with habits of ease, they too get the habit of sluggish action. The fact is, these organs are really sick, and have probably been so for a long time.

The sudoriferous system is meant to take some of the strain of catabolism from the excreting organs of the body as well as to perform its own special function of relieving surface tension, and our well-being depends largely upon its perfect and faithful operation.

Suppression of the eliminating functions; adolescence. Unhappily, when the young girl approaches womanhood she is taught that it is unbecoming to play, which seriously affects her habits of open-air and other healthful exercises; she is dressed in tight-fitting clothes, which interfere with her circulation, digestion, and functional and general well-being—all of which tends to lower the standard of health and the checking of free perspiration, which in itself is one of nature's great safety-valves. Our boys, being less restricted as to clothing, and as to exercise less convention-bound, lead as a rule more healthy lives, and until early manhood, when smoking and the more serious forms of dissipation in general unite to make serious inroads upon their constitutions.

I mention smoking because it is such a universal habit. The pyroligneous acid developed in smoking acts as an irritant to the mucous membrane of the oral cavity, perverting the action of the mucous follicles, and the acid swallowed acts in a similar way upon the flow of gastric secretions, and much of the food which should be digested in the stomach is passed on to the intestinal tract without having been properly chymified, which tends to create gastric and gastro-intestinal disorders.

Even if our young friend is not a smoker he gets into trouble, for he usually chooses a business career which exercises his mental rather than his physical forces, and soon he gives evidence or symptoms of a sedentary life. He omits to take health-sustaining exercise; his functional activities become less and grow weaker, and another door is thus opened to functional degeneracy of all kinds.

In my efforts to trace these diseases back to their primal causes I am convinced that rapid eating, with insufficient mastication, and too great quantities of food, whether in health or sickness (although instinct prompts us to refuse food when sick), whether exercising or not, exert a great influence—are in reality responsible for these conditions, and therefore have a direct bearing and distinct relationship to pyorrhea alveolaris.

The power of habit is indeed strong; and, for the years of indiscretion, the penalty is exacted of us all.

THE SECRETIONS IN METABOLISM: THE SALIVA.

The various secretions of the body for normal assimilation of food are practically interdependent for their normal physiological constituency. If the process of metabolism has been faulty, all the secretions must suffer some change, which change never is to raise the standard of their efficiency, but always to lower it. And this applies to the saliva, one of whose physiological functions is to inhibit the action of bacteria in the mouth. The incubating medium for bacteria, mucin, which adheres to the teeth, does not precipitate and so form a medium of infection, when the mouth is safeguarded by normal saliva.

Caries of tooth structure is the first grave pathological symptom which confronts us, due to defective fluid defenses, while, too, in youth gingival symptoms may manifest disease.

We are told that clean teeth will not decay; but is there a dentist who believes that his patient whose mouth indicates a predisposition toward caries can absolutely prevent caries by the most fastidious care which he and the operator can bestow? On the other hand we have the careless, unhygienic person who passes through a period when no operative procedure is necessary, not even for the so-called incipient pyorrhea alveolaris; and let us suppose that at the same time the cleanly one has reached the period of immunity from caries, yet distinct indication of recession—atrophy—of tissue has occurred, with or without calcular deposits, or probably including some phase of so-called pyorrhea alveolaris. These conditions are seen in everyday practice, and the patients may be members of the same family. Nothing short of a constitutional predisposition or involvement can explain such a phenomenon.

DYSCRASIA MUST PRECEDE LOCAL LESIONS.

We are told that malocclusion, extraction of teeth, imperfect tooth restorations, etc., are frequent causes of pyorrhea alveolaris, because of mechanical imperfections. I wish to point out that in almost all of these cases such conditions are factors of the disease only inasmuch as they contribute an environment favorable to it, but that the real cause antedates the local factors by probably many years. Organic dyscrasia or degeneracy must precede the manifestation of the local conditions. Vaccine therapy sustains this when it so raises the index that the local (infective) conditions become subjective.

From the standpoint of pure physiology would it not be admitted that the process of healthy metabolic function would take on pathologic symptoms, were a perfectly normal, vigorous specimen of manhood to change from those habits which make for health to the eating of food three times a day without properly masticating it, and in quantities several times in excess of the physical needs? Just a few days of such abuse would be enough to cause pathological symptoms, but were that perfect physical specimen to continue the evil practice throughout life, spurring his waning appetite with condiments of various kinds between each of many food courses and preceding his dinner with several cigarets and alcoholic beverages, and interspersing his food with as many different wines as courses, and then, finally, inhibiting digestion by taking, on top of it all, the residue of tobacco-burning and distillation—what would be the result? Even we, sane practitioners of the healing art, do that ourselves regularly, without apparently appreciating what a beautifully balanced, complex piece of machinery we are misusing. Should we marvel when something goes wrong?

Condiments. Condiments are not strictly alimentary substances, but they play a part in the alimentation of man, and are of value if not abused. Food is rendered more palatable by their use, and they encourage the desire to take more, for we are guided in the choice of food by taste and smell. Condiments stimulate a flagging appetite, and also, through their aromatic and pungent qualities, assist digestion by promoting the secretions—but that should not be necessary in the normal individual. Food should be taken only when the need of it is felt, and the way to regulate that—if we are to eat, as per custom, three times daily—is to reduce the quantity taken at each meal until there occurs between meals a distinct desire for food. Rather go without eating until the desire asserts itself than use a whip to spur a jaded appetite.

PATHOLOGY.

I need not go into the pathology very deeply. It is enough to say that minus any contributory factor from the oral cavity which could add infection to the gastric and intestinal fluids, there would be, first, over-stimulation of the alimentary glands, then overwork with its consequent weakening effects, faulty secretion, and irritation where tobacco and alcohol are used. After over-stimulation and overwork, irritation would be the sequence anyway, even though decomposing foodstuffs improperly masticated and insalivated had not already worked their pernicious influences.

The stomach and the intestines have not the power to discriminate as to how much food they will digest, but they do belong to a labor union and once in a while they strike, but only because they can't work any longer. The glands secreting digestive ferments handle all food possible until their powers of manufacturing fluids for food conversion are exhausted.

As the power of the glands wanes, decomposition begins; and when it ceases, decomposition yet goes on, and toxic elements thus become part of, are absorbed by, and impoverish the nutrient fluid, the lymph.

The *metabolic action of the cell life* must be mentioned. The converted food finds its way to the lymph-vessels and then to the blood, where it is distributed to all the tissues of the body. But, what then takes place?

If the individual spends much time in the open air and sunlight, is active, and perspires enough, much of this excess of pabalum can be used by the tissues and eliminated through the sudoriferous system and excreting organs; but if he is leading a sedentary life, ingesting large quantities of food, some stimulants, and indulges in condiments too freely, the excess of material for assimilation cannot be used efficiently in the physical economy. The tissue cells all over the body endeavor to use up this excess, and become enfeebled and sick.

As the toxic elements of intestinal decomposition referred to accumulate, the cell functions become more perverted, their physiological character changes, their resistance becomes lessened, and thus the process of oral infection is made easy. But this food-abuse excess matter is subject to the laws governing metabolism; it must undergo change in passing through the cell. The result of this change is some waste, a substance to be eliminated, chiefly through the pores of the skin; it should not be retained and presented to the cells again. If retained it becomes a toxic element, and thus is added a second degenerating influence. Its continued presence in the arterial blood stream impairs that fluid and must be prejudicial to all cell tissue; it must also influence the chemical composition of all the body fluids. The sterility of saliva is reduced by a change in its composition; the change takes place in the gland; the cells of that organ cannot basally be very much at fault—so we are led to believe the nutriment to be the source of trouble. The soil is thus prepared in the oral cavity for infectional invasion.

I believe so firmly and inexorably in the power of the human organism—or nature, if any prefer the term—to reestablish chemical balance that I think it useless for us even to hope to supply some specific ingredient to restore lost balance in saliva. Each individual is a law unto himself, and the need of every case is different. The physiological chemistry of the cell is too complex for our understanding as yet. I am afraid that we as investigators are losing our balance, and need a specific.

ORAL DEFENSE AGAINST INFECTION.

Normally all fluids of the body, the blood serum, salivary, gastric, and intestinal fluids, are endowed with power to make bacteria innocuous or sterile. If, however, the potency of these fluids be impaired, then disease must manifest itself. The mucous membrane of the oral cavity normally is provided with double defensive means, and is able to purge itself of bacterial irritants. It is claimed by able pathologists that if infection does reach the stomach, bacteria cannot exist in the presence of the gastric ferments, and therefore cannot reach the intestines. If that statement be true, then my contention that the disease under discussion is of faulty nutritional origin has an even stronger foundation.

The early manifestation of the disease has been termed

"INTERSTITIAL GINGIVITIS."

Fortunately, the epithelium of gum tissue, or the underlying fibrous tissue, not being tissue of special function, becomes restored after impairment; but alveolar tissue is tissue of special function, more poorly nourished than any other bone tissue of the human body. Probably owing to the physical demands of stress it is more porous than other bones, but unfortunately this contributes to its degeneracy in cases of disease permitting of rapid and wide infection. The first step in the dissolution of the hard tissues—alveolar—is *inflammation of the periosteum.* The underlying process recedes or absorbs when its nutrition is interfered with, and recession continues until the outer, denser covering of the bone at the point of attack is absorbed. Nature seems to put forth her greatest defenses at this stage in an effort to prevent the destruction of this membrane. The most acute inflammation is realized. The bone has not yet been invaded, and if all gingival irritations, mechanical and chemical, be removed at this stage of tissue destruction the prognosis is favorable; the case has not attained a serious aspect. If the patient receives and follows proper instructions as to local and general hygiene, and hygiene of diet, the case will stem the tide. Teeth need never be lost if the patient be kept under surveillance from this time. Atrophic alveolitis, even pyorrhea alveolaris, has been at least postponed.

The preceding symptoms are the so-called "interstitial gingivitis." After the penetration of the periosteal tissue any absorption of the alveolar process must be regarded as alveolar disease; it may or may not be accompanied by pyorrhea.

We have always been taught that the destruction of the periosteum means as a result the death or absorption of the underlying osseous tissue. When that occurs to the alveolar tissue the effects must remain the same. By destruction of the periosteum near the gingival border, or apex, or weakest part of the alveolar cone where it is anastomoses with the pericemental membrane, the osseous tissue is deprived of its covering, its nourishment is impaired, and, like all such tissue, it is gradually but persistently absorbed.

Added to the destruction of the periosteum when it reaches that stage, which in interstitial gingivitis it is liable to do, infection of the cancellous tissue by micro-organisms occurs. This latter complication is more grave than the former would be alone. The arrest of the disease at this point, even though the epithelial tissue has bridged the space, does not change the physiological law; absorption of alveolus continues, though probably very slowly, depending upon the extent of infection or the vital resistance of the patient. The cancellous tissue has been invaded; the prognosis is different.

POCKETS.

The next stage met with in the progress of the disease is the establishment of pericemental recesses, pockets more or less deep. During this period pericemental abscesses may occur at irregular intervals; they are caused by stricture at the orifice of the pyorrhetic pocket—a cyst is established. *Now* the term "pyorrhea alveolaris" may with truth be used.

This is a critical issue, for together with the establishment of the abscess another consequent breaking-down, with necrotic involvement and deep alveolar infection, is possible, the future usefulness or the life of the tooth is much impaired, and the possibility of permanently controlling the disease is lessened. Destruction of the supporting osseous tissues is liable to go on rapidly after this stage has been reached, the so-called pyorrhetic pockets grow rapidly in depth. Necrotic areas—that is, areas from which the periosteum has been entirely denuded—can be recognized upon exploring, for the necrotic stage has now been fully established. There may or may not be looseness of the teeth as yet. There may be an abundance of salivary calculus or there may be none. Pus may or may not appear to be present.

Mobility does not necessarily mean involvement beyond redemption unless the tooth shows that rotation can be made in its socket. A mobile tooth may even not be pyorrhetic in a mouth where the disease is present; it may be due to faulty occlusion or no occlusion at all.

INFECTED ALVEOLI.

And now I wish to say a word about infected alveoli, whether actually necrotic or not. My observations lead to the conclusion that where the periosteum has been destroyed about the teeth (and the greater the destruction, the more rapidly is the truth manifest), and absorption of part of the alveolar tissue has taken place, this atrophying process persists in spite of the fact that the pyorrhetic symptoms have been cured and the parts restored to health.

This physiological pecularity generally progresses quite slowly where good hygiene is maintained, but that it does continue or persist I am convinced. To me it is another link in the chain of evidence for the constitutional theory of atrophic alveolitis. Destruction of any part of the periosteum I maintain to be the cause.

To sustain this point let me call your attention to the mouths from which all teeth have been lost. Those patients who have become edentulous through destruction by caries where no alveolar involvement preceded suffer very little change in shape of the alveolar ridges all through life, although as a rule such patients lose their teeth at an early age. On the other hand, those who lose their teeth through so-called "Riggs' disease," although past middle life, find that the dentures that they wear do not fit so well after a while, the jaws having changed very materially, so that every few years the process of denture-making seems necessary.

The foregoing facts would really warrant us in dropping the term pyorrhea alveolaris altogether, for the reason that it proves that pyorrhea is but a symptom, an effect, and in no way the cause of the disease.

THE QUESTION OF CURE.

There are many who adhere to the theory that pyorrhea alveolaris is of local origin only, and thoroughly curable by local treatment.

That there may be no misunderstanding, we should first determine what is meant by "pyorrhea alveolaris" and what is meant by a "thorough cure." It is but fair that we should select the average case for illustration. For instance: One whose parents insisted upon periodical care of the teeth, who upon reaching maturity appreciates the importance of visiting his dentist once a year, let us say, and one who brushes and flosses the teeth regularly. His dentist has been above the average in his ability to make good restorations. No teeth have been lost, or probably a tooth or two. In childhood and in youth cavities developed, always interproximally or in fissures. The teeth may be somewhat malposed, but not irregular enough to be thought, by the average dentist, menacing to the life of the teeth or to health. At fifteen, the operator pronounced the case an excellent type, and all that was required was the filling of a very few cavities, or the removal of some discolored spots. At twenty he exhibits with pride the fruits of his labors; a carious spot or two to be repaired, and just some light calculus to be removed. At thirty, nothing to do but cleansing; at thirty-five the same, but calculus heavier, and there is some recession of the gums interstitially, and in places some little gingivitis. At forty the calculus is quite heavy and subgingival; about the molars the cementum is quite uncovered. There develop at those places sensitive spots, or caries, or even exposed pulps, and more or less deep recesses are found in the years following.

The dentist pushes his prophylactic knowledge by having the patient call more frequently to have the calculus removed. An abscess develops at one place or another about a tooth; the operator is at a loss to account for it. He burs into the tooth affected, only to find the pulp vital. The abscess persists; he devitalizes the pulp, treats and fills the pulp canals thoroughly—yet the abscess persists.

This is a word-picture of the various stages the case passes through. Generally it is at this point that the specialist is called upon to take up the work. This is pyorrhea alveolaris, as I recognize it. There are infinite variations of it, of course.

PALLIATIVE MEDICATION.

Now, as to a cure: After all else has been done for any case, it has been conceded that instrumentation is of greatest importance. That the subgingival disease can be cured is beyond question, but the oral manifestation of impaired function which I believe to be accountable for dental caries as well as pyorrhea, we need to fathom; and I wish it understood that this paper indicates an effort toward preventive rather than curative measures.

There is an inherent power of resistance in all tissues, and particularly in the oral tissues, causing them to respond very quickly to any relief afforded them. For instance, take any case of pronounced pyorrhea alveolaris, and without any instrumentation whatever you will find that by spraying the mouth liberally with pyrozone and using germicides, then by using strong astringent and stimulating or mild escharotic or other germicides as medicaments, the local infection can be so reduced, the toxic effect of bacteria so inhibited, that inflammation will subside and the conditions markedly improve.

This same subsidence of local symptoms occurs when vaccines are used. Each of them masks the symptoms—on the one hand by reducing the local infection; on the other hand by raising the opsonic index—but the improvement cannot in either case be termed a cure, neither method being complete.

This test also sustains what I have said about salivary calculus, that it is an inert salt the product of imperfect cell metabolism, incapable of being the cause of pyorrhea alveolaris. Even the complete removal of salivary calculus does not in the majority of cases constitute an *absolute cure* of this disease. The removal of all foreign substances restores local conditions for a time, but the fact that we find it necessary to keep our patients under constant surveillance, periodic prophylactic work being necessary, is evidence that the expenditure of all this energy locally is *not enough,* but it must be supplemented by something more, to establish immunity. Not until we reestablish the patient's physical tone so that the saliva can take care of all so-called adhesions (gelatinous or mucoid), with their accompanying micro-organisms, and salivary calculus ceases to precipitate, can we say that we have cured the disease. I have convinced myself that in the early stages of the disease, cell tissue rehabilitates itself readily; later in life it is more difficult to re-establish function which has been perverted.

In all departments of science people are prone to forget that the effect is but the development or evolution of the cause, and always commensurate with it, and further that the effect always lies within the domain of the cause. If the effect lies within the domain of the cause, then the theory of heredity, which frequently is put down as a cause, has no foundation. It has been said that in medicine there are two types of doctors: one treats superficial symptoms, the other searches for causes before he prescribes. The one treats the headache, the other the functional disorder which caused the headache. If the cause can be removed the resisting powers of the individual are strengthened. If the cause remains they are weakened.

INSTRUMENTATION.

I have given a lengthy discourse on the cause and effect of interstitial gingivitis, atrophic alveolitis, or pyorrhea alveolaris; now you would like to hear how the disease may be controlled. I have taken up so much of your time that I can only outline the most important phase leading toward establishing immunity—namely, instrumentation, or surgery.

I would like to say at the outset that the many truths the operator must learn, either before or after the operation, reach their climax in this, that "instrumentation" in pyorrhea alveolaris is an art of the highest type, requiring peculiar genius, training, power of discrimination, and experience.

Unless the operator understands thoroughly his responsibility and the requirements, and is equipped to render the best possible service, he is doing himself and his patient, and incidentally his profession, a gross injustice in practicing this class of surgery.

Such qualifications are attainable by the general practitioner only after long and determined application. The ability to correctly diagnose disease can come only through experience, discrimination, and that other, sixth sense, intuition.

There should be no limitations as to the time required to treat pyorrhea alveolaris, as thoroughness is absolutely essential. It is the one dental service where the operator is required to continuously put in his best, irrespective of his physical feelings.

Instrumentation is so very important that exponents of all other methods have finally been obliged to concede that surgical procedure is the prime necessity.

Method of procedure. The method of procedure in any surgical case should be such as would meet the approval of advanced medical and surgical technique; this refers particularly to antiseptic care. It is a great mistake to suppose that further infection cannot be induced in a mouth already impaired; I do not mean by use of instruments that have not been sterilized, but by carrying infective material from one locality to another in the same mouth. Before exploring the recesses about teeth, before using instruments of any kind, the procedure should be to spray all interdental spaces, buccally, labially, and lingually, with a warm dioxid solution. Too much air-pressure must not be used. The pressure-gage should not register more than 10 or 12 pounds, and the stream should not be guided directly into possible pockets (the long axis of the teeth) but transversely between the teeth, bucco-lingually or labio-lingually. An excellent plan is to constantly dip one's instrument into some good germicide during instrumentation as another safeguard against infection. There are many good ones, but I prefer argyrol 25 per cent., because of its non-irritating, tasteless, odorless character.

Technique. This is a character of dexterity that is acquired by the prophylaxist —if we may call him such—only by years of patient, painstaking application. Here is the one operation in dentistry, so I have found, that demands the most self-sacrifice; it is the refinement of surgery. There are few operations on the human anatomy which call for greater skill and more endurance upon the part of the operator. The mastery of technique requires that one should work extremely delicately, keeping in mind a mental picture of the instrument, concentrating the visual attention on the area being operated upon, as though one actually could see the working part of the blade. There is hardly more guesswork in removing deposits from a root than there is in any other operation in the mouth, though the sense of touch is the only guide when the point of the instrument is hidden.

In cases of gingivitis, and in periodic prophylactic work where the adhesions are not too tenacious, I use wherever possible the *ideal instruments* for such work—perfectly smooth, such as heavy explorers, rounding the points so that no part of the instrument will mar the tooth substance, which will be left somewhat burnished after its use.

The *conservation of the dental ligament* is of vital importance. I quote from Dr. Johnson, who, in his "Operative Dentistry," says: "It is extremely important in all operations involving the gingival tissues that the rope-like border surrounding the cervix of the tooth be not severed or mutilated. It recovers slowly and is seldom reproduced like the original."

Thoroughness. Where the disease is in the incipient stage many teeth can be operated on at one sitting, but even here—or I might say, particularly here—great care must be exercised to positively free the root from every particle of adhesions. The mistake is often made of treating this phase of the disease lightly or with indifference, and of not giving the time and attention to it that it positively requires. No greater mistake can be made than this. Just here is where the great fault of the profession has lain; their great lack has been that of not treating seriously the incipient signs of disease when observed, and of not seeking interdentally and subgingivally for, and removing, all minute particles when cleaning the teeth. If it is a question of fee, the operator must educate his *clientèle* to the value of paying for time. I hope that Dr. Clapp's paper has well impressed upon you the necessity of establishing a minimum fee, which must be a livable fee at least. A dentist cannot do prophylactic work at two dollars an hour and make a living.

One of the peculiarities of this disease is that after rupture of the peridental ligament, calculous deposits in line with the long axis of the tooth, and one should use instruments which operate preferably in straight lines with this long axis and dislodge adhesions on both push and pull strokes, particularly the latter.

There are two essentials in instrumentation. That of greatest importance is the necessity of *removing all adhesions.* The other is *burnishing*—referred to later.

As a general thing the surgical treatment of the roots should be carried on with so much care that little pain may be caused. The less destruction of vital tissue and the less inflammation caused, the more readily will the reparative process be secured.

I prefer to operate without an obtundent, because of the physical sign the patient can give when the base of a calcic recess is reached. However, there are instances where it may be required.

THE INSTRUMENT AND THE MAN.

There have always been two great weaknesses in the care of pyorrhea. One has been the *instrument.* My observation as well as experience is that the operator usually procures instruments and then proceeds to adapt himself to their structural peculiarities. He knows or has it forced upon him that they are inadequate for most of the big undertakings—and, by the way, that is where they are most vitally important. I know that most of my early failures were due to my inability to accomplish with such instruments all that the inventor claimed for them.

Another great factor is *the man.* If there had not been remarkably good men behind the guns the instruments would not have made the record. If nature had failed as many times to bridge the gap as did the instruments, half of humanity that has been treated for pyorrhea would be edentulous.

THE WRITER'S INSTRUMENTS.

I have been asked to show my instruments. I beg of you to please not consider that I am exploiting them. I have no more financial interest in instrument-making than any of you have, but I have devised an instrument that I exhibit with a great deal of pride. These instruments are not supposed to supplement all others now in use, but, as several of my friends have put it, they take up where all others leave off. These instruments can be appreciated only when one reaches the attachment of the peridental membrane with the root and alveolus. Instrumentation there is the crux. To be able to get the point of an instrument on or beyond the adhesions at this situation is the most important part of the operation. It is within the ability of the so-called expert with the instruments generally in use to remove calculus from the *deepest* pockets—all but that which is in direct contact with the peridental membrane which still exists, that which is really the exciting cause of the disease, for all other calculus is as naught by comparison. The mill never grinds with the water that has passed.

These instruments are entirely original for pyorrhetic work, and their extreme delicacy makes them invaluable for the work intended. The blades are serrated on the face which engages the tooth. The ends and sides of the blades are beveled chisel shape. These several features make the instrument operative both in the push and pull stroke. Each instrument has the same type of blade end. It is an instrument that can be introduced easily into the deepest pyorrhetic pockets without mutilating the tissues, and will reach beyond the deposits without either causing undue pain by distending tissue or being itself impeded. It not only dislodges while pushing, but is also operative on the return stroke. Other features—besides its delicacy, which assists rather than interferes with the sense of touch—are its strength and rigidity, for much power is often required to break down calcular adhesions. It is effective, as well, when moved laterally.

The shank is so shaped as to follow the contour of the root, thus interfering least with the delicate manipulation of the working-point. The effect of such an arrangement of blade to shank, with its "rest," is to make of the instrument a plane whereby the working-end can be controlled.

There is a system of instrumentation being exploited all over the country at the present time which advocates the planing of the tooth surfaces. The instruments that comprise the set are not planes, but a modification of a hoe—they scrape the root surface. Whether they scrape plane does not signify, but that they do cut into the cemental structure is of great importance. To remove any portion of the root must be against all rules of dental osteology.

It does not seem to be generally known that the structure of the cementum of a tooth somewhat resembles subperiosteal bone; that under its lamellæ or outer structure is a system of lacunæ very much like the Haversian system of bone. It seems self-evident that our efforts should be toward preserving intact this hard outer covering of the root, particularly subgingivally. If under the surface the cementum is cancellous, then to expose such cancellous structure means to invite infection if micro-organisms gain access thereto. At any rate, when once made rough by so-called planing, it is practically impossible to make it properly smooth again, and as I have said elsewhere, in proportion as we are able to burnish the root subgingivally will the highly vascular and extremely sensitive granular tissue constrict about the root and exclude foreign substances or micro-organisms. I wish to place great stress on this. Although the chisel-shaped end of my instrument makes of it a true plane which is very effective in removing adhesions, it must be used with care. The pull movement should be used almost exclusively in the deeper parts, but to facilitate that acuteness of touch it was necessary to make the instrument as delicate at the tip as it was possible to have it. Having located the deposits, the procedure is to lift the instrument until it rests on them and then put pressure on the shank and break down the adhesions by a pull stroke and a crushing process.

The working-point is bent at such an angle as to just lift the serrated surface from the tooth when the push stroke is used, but when pressure is applied against the root on the pull stroke the serrations lie flat against and engage the deposits, and the crushing of them is accomplished. I have purposely avoided complicated bends or angles or corkscrew effects, endeavoring to keep the instruments as simple as possible, with the blades always in line with the handle; thus, when the point of the instrument is obscure, the shank projecting from the gum line indicates the position of the blade on the root.

Instruments must be kept in perfect condition as to sharpness; there is no surgical work that more demands this.

GENERAL ADVICE ON INSTRUMENTATION.

An axiom should be: Never let go of a deep pocket when you feel calculus until you feel certain you have removed it; then never go back, never put an instrument in there again. If, after the lapse of weeks at least, inflammation persists, you may feel reasonably sure that your operation on that tooth was not thorough, and you must try again.

A good percentage of teeth are malposed, bringing two roots so close together in the alveolus that even the most slender instrument fails to get all the calculus. This is a very common cause of failure. The average pyorrhea instrument falls very far short of doing its work there. Of course some of the corkscrew patterns are of value for reaching areas of infection in bifurcations, etc., but even there I think instruments may be suggested that will be greater helps generally.

There are some round jewelers' and dentists' files—I believe they are called Riffler's files, and procured in wholesale hardware places—which I have shaped and which are invaluable to me, particularly when the disease has involved the region of root bifurcation. Instruments with compound or complex curves complicate the labors of the operator and tend to do damage, because, as I have mentioned, the tendency of calculus is to deposit in direct line with the axis of the tooth.

Instruments for general use in scaling. There need be no fixed rules; use instruments that would seem to adapt themselves best; it matters little what the original intended use of the instrument might have been. I have used all kinds of excavators, chisels, files, and even gold-pluggers and plug-finishers. But surgical treatment seems something more than the removing of calcic adhesions. To me it includes smoothing the surfaces under the gum to the gingival attachment and the polishing of such surfaces; I mean all surfaces that the instruments have touched, and not as has been the invariable practice heretofore, relying upon the porte-polisher, rubber disks, charged silk, etc., but the actual burnishing of all surfaces.

Instrumental burnishing. For this purpose I use a set of instruments, duplicates in shapes of those which I use for scaling, but having all surfaces smooth; with these I am able after surgically treating a root to immediately follow it with a burnisher, which is also employed to carry my medicament when one is needed.

This method of systematically smoothing all surfaces or roots operated upon and with special instruments is original, I believe. When we consider how vascular and how extremely sensitive is granular tissue, is it any wonder that many cases have not been cured?

The tooth roots subgingivally cannot be too perfectly smoothed. Reconstructive granular tissue, following pyogenic exfoliations (in fact, pyogenic tissue is but granular tissue in a state of disease) is extremely vascular and delicate, and should be given every opportunity to do its best. Recognizing this physiological fact, all root-surfaces should be prepared accordingly. The more polished the root the more perfect the healing.

Except for the removal of stains at the end of pyorrhetic treatment I rarely use pumice of any kind. When the patient returns for prophylactic attention, I use precipitated chalk or calox powder only. Even the finest pumice leaves the cementum etched. Stains or adhesions become readily attached to such surfaces. If I were teaching men from the foundation up how to care for this disease, the one other thing I would insist upon, would be *the burnishing of all instrumented surfaces.*

Good generous tooth-brushing several times daily is of course indispensable, and the use of floss and gum massage—but I cannot go into prophylactic work.

Bismuth paste, potassium chlorid paste, or other paste may be used. I always make a special effort to obtain patients' co-operation and a promise to follow up prophylactic work upon return to their dentists, and if possible to present to me once a year for examination.

Do not forget that successful operation is not a pastime, but an evolution from long experience, intimate and painstaking observation and careful analysis, with a severe disregard of non-essentials and of repeated failures, and with unfailing persistence born of optimism, the courage of proved convictions, and hard common sense.

PRESERVATION OF GOOD HEALTH AND SOUND TEETH BY EATING NO OTHER BREAD THAN THAT COMPOSED OF FLOUR WHEN THE FERMENTS OR ENZYMES OF WHEAT HAVE PERFORMED THEIR ACTION.

By **THOS. G. READ**, D.M.D.Harv., L.D.S.Eng., Blackgang, Isle of Wight, Eng.,
FORMERLY DENTAL SURGEON TO THE NATIONAL DENTAL HOSPITAL OF LONDON.

A GRAIN of wheat consists of an envelope inclosing a hard kernel and a softer shield-shaped body, which is the vital part or germ.

STRUCTURE AND CHEMICAL COMPOSITION OF WHEAT GRAIN.

The envelope or husk is known as bran, and consists of three coats, which are composed of woody fiber and cellulose, with a little proteid material. The bran is rich in earthy salts, but they are so placed as not to be readily assimilated by the human system, although some birds and animals can assimilate them. Nature has provided wheat with the outer coverings to preserve it from damp. By this means the vitality of mummy wheat is safeguarded.

The kernel consists of cells of irregular shape containing starch lying in gluten. The cell walls consist of cellulose. The kernel is very deficient in earthy salts, a little being in the outer portions, but practically none in the center. It is a matter of little importance with a mixed diet whether bread contains earthy salts or not, as when a food is deficient in phosphates a natural craving is developed for other food containing them.

The germ or vital part of the grain consists of the embryo or young plant lying in a shield-shaped body; this is separated from the other part of the grain by a layer of columnar cells, in which the ferments or enzymes have their origin.

Under the influence of suitable moisture and moderate warmth, certain changes take place. Two ferments operate; one acts on the cellulose and the other, known as diastase, acts on the starch of the kernel, converting it into glucose. Thus the insoluble cellulose and starch are converted by these ferments into soluble bodies.

EFFECTS OF ROLLER MILLING ON WHEAT FLOUR.

As mentioned above, the outer coverings of a grain of wheat preserve it from damp. When wheat containing the unimpaired ferments has been ground, the flour suffers if kept long afterward, as it becomes rancid. About fifty years ago, to overcome this tendency of flour to deteriorate with age, a method of milling in which the germs are removed early in the operation was devised in Hungary, known as roller milling. In roller milling the germ is removed; the result is a great loss of nourishment, for the germ is the most important part of the grain. The germ contains fat, protein, and earthy salts, which are more readily taken up by the human system than those contained in the bran. Of most importance for general health, the germ contains diastase, which must perform its action to preserve good health and sound teeth.

Until the invention of a roller mill, the only method of milling was by means of stones. With the old stone mill, the grain is cut or torn apart, and the flour consists of fine particles of all parts of the grain, the coarser pieces being removed from the flour, after milling, by means of mechanical sifters or dressers. These coarser pieces are removed, because large particles of the husk or bran, or of the cellulose walls of the starch cells are indigestible, and act as an irritant to the mucous membrane of the intestines; thus, when given to children, the passage through the alimentary canal may be too rapid for food to be properly assimilated.

With the roller mill the grain is crushed and pulverized and the resulting flour consists almost entirely of starch and gluten. There are no particles of the germ or of the bran in such flour, as these parts cannot be pulverized by the rollers, and are removed early in this process of milling, the great object of roller millers being to obtain a germless and a branless flour.

FORMATION OF NASCENT LACTIC ACID DURING MASTICATION OF ROLLER-MILLED FLOUR BREAD.

All freshly made flours are free from acid, but all breads are slightly acid, and become more so when stale. The stale natural acid of bread does no harm to the teeth during eating; it is the forming or nascent lactic acid that does harm during mastication. Minute quantities of this, so frequently forming in the mouth during meals, and each minute quantity only remaining in contact with a portion of a tooth for a brief period while passing through the mouth, slowly cause dental caries. Lactic acid in its nascent state has a very powerful decomposive action on tooth tissue. The acid once formed soon loses its more powerful decomposive action; thus food resting in the mouth is more a sign than a cause of dental caries.

When the unimpaired ferments of wheat are present in the flour, the diastase of the wheat germs converts starch into glucose during breadmaking. When such bread is masticated, no acid is formed during chewing, and the glucose passes unchanged into the alimentary canal. When bread contains glucose formed during breadmaking, it has to remain in the mouth for about five hours for lactic acid to be formed from it. When the ferments of wheat have been impaired or removed during the milling of the flour, no glucose is formed during breadmaking. When such bread is masticated, lactic acid is very rapidly formed in the mouth, as the ptyalin of the saliva rapidly converts starch into glucose, and, from this forming sugar, bacteria in the mouth form lactic acid.

EXPERIMENTAL CARIES AS PRODUCED BY DIFFERENT BREADS.

The conversion in the mouth from starch to lactic acid is only a matter of seconds during mastication, and the powerful decomposive action of this lactic acid upon enamel has to be repeated for many brief periods at the same spot for the enamel to be disintegrated, thus starting active dental caries.

If a number of sound teeth be obtained, and the crowns be embedded in freshly chewed breads in a warm room—some of the crowns in bread made from flour not containing the ferments of wheat, and some in bread made from flour containing the unimpaired ferments of wheat—removing the teeth from the freshly chewed breads, wiping them, and replacing them in freshly chewed breads about as frequently as the mouth is emptied and refilled with food during eating —the nearer the conditions approach to those of the mouth during mastication, the more rapidly chewed bread made from flour not containing the ferments of wheat will disintegrate the teeth, and the less effect will chewed bread made from flour containing the unimpaired ferments of wheat have upon them.

The teeth should not be allowed to remain in stale chewed bread, and at the end of a series of chewings they should be kept in distilled water until commencing another series of chewings.

The above experiments prove that brushing of the teeth after eating bread made from flour not containing the ferments of wheat is on a par with locking a stable door after the horse is stolen. The harm already done is not reduced.

PROPHYLACTIC DIET.

The right method to preserve sound teeth is to avoid eating food that forms lactic acid during mastication. The chief factors to develop the full nutritive qualities of bread are the ferments of the grain, as can be demonstrated by feeding on food in which the ferments have not been destroyed, or on food in which the ferments have performed their action, when good health will prevail. Upon feeding on similar food in which the ferments have been destroyed—in the case of cooked food, before cooking—the health will become impaired; and on refeeding on the former food, good health will soon be recovered in most cases.

EFFECT OF DIFFERENT MEALS ON LIVE-STOCK.

Cases of impairment of health in animals and birds due to the ferments of grain and meals having been impaired or destroyed have come under my notice. In fact, it was owing to some young pigs, that had been reared on locally ground barley meal, being fed on stale imported barley meal, that first, in the early nineties, my investigations were directed to the importance of the ferments of grain for the maintenance of good health. This resulted from having a circular trough with eight divisions, and weaning nine pigs. Thus at feeding-time, one pig was unable to be eating, and waited until one at the trough raised the head; then the outsider captured the place until another took it. It amused me to watch the excitement, until one day, when the pigs were fed, they showed little interest in the food. There being much swine fever in the neighborhood, I wondered if this was an early symptom of an attack, but the stockman ridiculed such a suggestion, owing to the curly tails, erect ears, and sleek coats of the pigs. He suggested that the pigs did not like the food. Since the barley grown on the farm and ground into meal at a local mill had been all used up, a supply had been obtained elsewhere; this he thought was foreign-ground meal. The pigs did not do well on their change of meal, and some weeks after, their tails were hanging straight down, their ears flopping like those of elephants, and their coats dull. Then one pig died, and a government inspector came and took away parts of the dead pig; he later reported that it was not a case of swine fever. Thereupon the pigs were again fed on barley meal grown and ground in the neighborhood, and the remaining eight pigs soon recovered, were fattened, and sent to market. The dealer who supplied the barley meal which the pigs did not like admitted that it was imported, but stated that it had no musty or objectionable odor; in fact, it had very little odor.

When the lid of a bread-pan is lifted, it is easy to discern by smell whether the ferments were in the flour from which the loaf was made. Meals have very similar odors when the ferments are not destroyed. The ferments of the imported barley meal had been destroyed.

Some years ago the late Lord Stanley of Alderley wrote me concerning some bullocks on a Welsh farm, suffering from pellagra. The local veterinary surgeons were baffled as to the cause. A man from South America saw the poor beasts and said: "The pellagra is due to giving the bullocks broken maize that has lost its vitality. Give them sound corn and they will soon be all right." This was done, and they soon recovered.

The staple industry of the neighborhood of Heathfield, Sussex, Eng., is fattening chickens, chiefly for the London markets. Since chickens during fattening have no exercise, and should remain only twenty-one days in the crates, it is most important that the food, besides being conducive to fattening, should keep the birds in the highest possible condition of health. The diet for fattening chickens is Sussex ground oats, sharps, milk, and fat. When the ferments of the oats are injured or destroyed, the chickens do not do well. The local stone millers who supply the fatteners usually grind daily, and supply the fatteners weekly with freshly ground oats.

IMPORTANCE OF GRAIN FERMENTS FOR GOOD HEALTH.

The results of unsuitable foods are apt to be regarded, when relating to the human race, with indifference, as unavoidable evils of civilization. It is quite otherwise when the health of livestock is involved and actual financial loss incurred. In fact, the quality of the food of the people is treated as of less importance than that of livestock.

When the food of man, domestic animals, or birds is chiefly derived from cereals, the action of the ferments of the grain is of the utmost importance for the maintenance of good health, since, if these ferments are destroyed or removed, the qualities of the foods are quite changed, and the omitted action of the ferments cannot be made good by the use of other food.

The effects upon nutrition of the presence or absence of the ferments of the grain are such that, in time, they may prove a matter of life or death.

Removing or destroying the ferments of wheat during milling besides destroying the teeth, may, under some circumstances, destroy life.

CONSTITUTIONAL RESULTS OF PYORRHEA ALVEOLARIS.

By **M. M. BETTMAN, D.M.D., Portland, Oregon.**

(Read before the Oregon State Dental Association, at Portland, Ore., May 21, 1912.)

THE most distressing and destructive lesion of the oral cavity, and the one that unfortunately receives the least attention from the average practitioner of today, is pyorrhea alveolaris. This disease, which, as is well known, destroys the attachments of the teeth and eventually causes their loss if not given proper treatment, has a still more serious effect upon the general constitution of the patient affected. Pyorrhea alveolaris to my mind is a very serious condition, and one that should be given a great deal more consideration than it is receiving at the present time. We all realize that if a pyorrheal condition is neglected, the patient will sooner or later lose his teeth; but how many practitioners realize the harm that is being done to the patient while this lesion is allowed to progress, with pus oozing from the pockets, passing down the throat into the stomach, and thence being absorbed into the general circulation of the individual, causing any number of disease conditions in the different organs of the body.

INGESTION OF PUS.

The amount of pus exuded in the average case of pyorrhea in twenty-four hours amounts to a considerable quantity, depending, of course, upon the number of pockets present and the severity of the case. As this pus is discharged into the mouth, there is only one natural way in which it can be disposed of, and that is by swallowing it along with the saliva, or, when eating, by mixing it with the bolus of food and allowing the pus-infected food material to pass down the alimentary canal into the stomach. Dr. John Fitzgerald says:

> Pyorrhea alveolaris may act in three different ways in the causation of systemic disease. The pus, with its multitude of putrefactive organisms and decayed food remnants from the pus pockets, may be swallowed, and either act locally upon the stomach wall or set up fermentation of the stomach contents. The toxins generated in the mouth may be absorbed by the mucous membrane of the mouth or stomach, and thus pass into the general circulation. The local condition of the mouth may favor the growth of pathogenic organisms, and thus render the patient more liable to certain infectious disorders, notably influenza. The power of pyorrhea to produce aggravation of existing gastric trouble reaches its maximum in cases where there is retention of food residues. This happens when the muscular walls of the stomach are in a state of atony, and also when there is some pyloric obstruction which prevents the organ emptying itself. In both these conditions stomach dilatation is eventually produced, with the result that the stomach is never completely emptied. The first condition is a very frequent concomitant of neurasthenia and allied states.

THE BACTERIUM COLI COMMUNE.

He further states that the bacterium coli commune is a constant inhabitant of the oral cavity, as a rule seemingly harmless, but under the influence of a culture medium such as would be furnished by a pyorrheal condition, this bacterium might, as elsewhere in the mucous membrane, acquire sufficient virulence to produce serious disturbances of the system, such as colitis, dysentery, and cholera nostras. If pyorrhea alveolaris is as dangerous to the general health of the patient as the foregoing would indicate—and it is even more serious, as I shall try to prove to you—I consider it the duty of the attending dentist to warn his patient of an existing pyorrheal condition, because in a large majority of these cases the patient himself is not aware of the presence of pyorrhea until it has progressed to a large extent, and perhaps has caused a metastatic condition in some other part of the body.

HARTZELL'S VIEWS ON SYSTEMIC SEQUELÆ OF PYORRHEA.

Dr. T. B. Hartzell of Minneapolis is quoted as saying that the dentist who neglects to call the attention of the patient to an existing pyorrhea is as much to be criticized as would be the physician who neglected to draw the attention of his patient to a serious disease simply because the patient did not ask him to prescribe for that special ailment. He further says that pyorrhea has caused nephritis, also that it is responsible for many cases of dyspepsia and not a few cases of neurasthenia, and that instead of considering gout and rheumatism as direct causes of pyorrhea, he is inclined to believe that the inception of rheumatism, which is now recognized to be due to a direct bacterial invasion, will be traced to pyorrhea. He also reports three deaths which were due to septic endocarditis traceable directly to virulent pyorrhea, and in which carefully conducted postmortems showed conclusively the direct relation between the pyorrhea and the endocarditis.

OSLER'S VIEWS.

Osler, in speaking of the effects of pyorrhea alveolaris upon the general system, quotes Hunter as saying that septic gastritis and septic enteritis are common sequences, and that he regards appendicular, pleuritic, gall-bladder, and pyelitic inflammations as forms of medical sepsis due largely to infection from the mouth.

RIGGS' REPORT OF A CASE OF BLOOD POISONING AND PURPURA CAUSED BY PYORRHEA.

A case is reported in which Dr. Riggs, as early as 1868, recognized the effects of swallowing immense quantities of toxic material. The patient was suffering from extensive blood poisoning and purpura on the body. Riggs claimed that the general condition was due to a severe case of pyorrhea alveolaris, and as a result of his treatment for the oral condition the patient recovered his health.

ERYTHEMA BULLOSUM AND CHRONIC NETTLE-RASH DUE TO PYORRHEA.

Dr. W. K. Sibley of London describes the case of a woman who had suffered for many months from a severe attack of erythema bullosum, and of a man with an equally persistent attack of chronic nettle-rash, both diseases of gastro-intestinal origin set up by neglected pyorrhea.

RHEUMATISM AND GOUT DUE TO PYORRHEA.

No less an authority than Dr. John B. Murphy, president of the American Medical Association, in an article published in the April 27, 1912, number of the journal of that Association, states that every type of non-traumatic joint inflammation is a metastatic manifestation of a primary infection in some other portion of the body. He cites a typical case of metastatic arthritis due to alveolar suppuration or pyorrhea. He further says: "We had at one time in Mercy Hospital four cases of rheumatoid arthritis, so called, with sinuses or ulcers in the alveolar processes, each bearing practically the same causal relation to the metastatic arthritic condition."

Drs. Wirgman and Turner report, in the London *Lancet* of recent date, forty-two cases of rheumatism and gout, in the majority of which they believe pyorrhea alveolaris to have been the direct cause, because a cure of the local condition was promptly followed by a subsidence of the constitutional symptoms.

QUARTAN MALARIA, INFECTIVE ENDOCARDITIS AND HENOCH'S PURPURA DUE TO PYORRHEA.

C. W. Smith and A. E. Barnes of England report a case of oral sepsis in which the patient presented symptoms strongly suggesting quartan malaria, infective endocarditis, and Henoch's purpura, but recovered on the extraction of several teeth. The entire disturbance was attributed to a suppurative gingivitis. Numerous other cases have been reported similar to the above, in which improvement of the general condition has followed proper treatment of an existing pyorrhea.

DEATH DUE TO PYORRHEA.

The following case, of which I have direct knowledge, shows an extreme effect in a neglected case of pyorrhea alveolaris:

Mrs. D., twenty-nine years of age, suffered with a lesion of the gums, which was diagnosed as pyorrhea aveolaris in August 1905, at which time all the teeth, both upper and lower, were affected. The teeth were loose and pus exuded freely from the pockets; the breath was very offensive. The only treatment prescribed was a mild antiseptic mouth-wash, the patient being told that nothing more could be done for her. About this time the patient was taken with a severe dysentery and later with pneumonia, from which she died in October of the same year. The attending physicians diagnosed the case as one of pneumonia due primarily to the pyorrheal condition.

PRACTICAL CASES.

A few cases taken from my office records are interesting, as they show the effects of pyorrhea alveolaris on the general health of the patient.

Case 1. The patient, a man of fifty-two years of age, had lost weight in eight weeks, decreasing from 235 pounds to 180 pounds. His stomach was affected, he was very weak, and could walk only with the aid of a cane, and with difficulty. His case was diagnosed by several physicians as a general septic condition, and was treated as such for several weeks, without any improvement. He could take only eggs and milk, and complained of soreness in the region of the stomach. His last attending physician examined the oral cavity and found an aggravated case of pyorrhea. The patient was then referred to me for treatment, in the belief that the general condition was caused by the large amount of pus present in the mouth.

The case was found to be one of severe pyorrhea aveolaris, with pus pockets around practically every tooth. The gums bled at the slightest touch, and had receded to a considerable extent on the posterior teeth. Upon questioning the patient I elicited the information that the pyorrheal condition had been first noticed about a year previous to his present illness, but had been given no attention, although the teeth had been filled.

The teeth and roots were thoroughly scaled and polished, and the usual treatment for pyorrhea was instituted. I advised the extraction of the upper molar, as the pyorrhea had progressed to such an extent that treating of this tooth was not advisable.

At the end of three weeks' treatment, during which time the patient received practically no other attention except that for the pyorrheal condition, he had gained 12½ pounds in weight. From that time on he continued to improve and to all appearances is himself again. The stomach trouble has disappeared entirely.

Case 2. The patient, a woman, married, about thirty years of age, had lost 20 pounds in a few weeks; she was very nervous and suffered with gastritis and slight attacks of rheumatism. Previous to this illness she had been well. She had trouble with her gums for several months; they bled at the least touch, though they had been treated superficially without any benefit. A pyorrheal condition was found about the upper and lower anterior teeth. The gums were very badly swollen and inflamed.

The pyorrhea was treated, and a cure effected. The patient reports that she feels "like a different person," having no more nervous spells and her stomach causing no trouble.

Case 3. The patient, a woman, of about thirty years of age, had slight stomach trouble of several weeks' duration, and the week previous to consultation had purpuric spots on the lower chin. She was very nervous, and had been affected with pyorrhea for six or seven years.

The case was found to be one of advanced pyorrhea alveolaris, with deep pus pockets around the upper and lower incisors, and shallower ones in the neighborhood of several of the posterior teeth. The gums were very inflamed, and bled easily. A considerable amount of tartar was present, and the lower incisors were loose.

The pyorrheal condition responded to treatment and the flow of pus ceased, followed by a tightening of the gum tissue around the roots. The stomach condition improved and the skin cleared up.

I could cite more cases, similar to the above, which I have had the pleasure of treating during my limited practice, but I believe the foregoing cases will suffice to prove the importance of the oral cavity in relation to the general system.

FAVORABLE PROSPECTS OF A CURE IN PYORRHEA.

In closing, let me state briefly but none the less emphatically that this destructive and dangerous lesion will respond readily to treatment, and if managed properly can be cured. In making this statement I not only express an opinion based upon my own limited experience, but I also state the results of the clinical experiences of a majority of those practitioners who have given this phase of dentistry their special consideration. Of course we understand that in the treatment of this condition we cannot expect to obtain absolute cures in each and every case, any more than we can rely upon an absolute cure in any other pathological condition; neither can we be certain of a permanent cure—for, as in most other lesions to which man is heir, the original pyorrheal lesion may be reproduced, providing the same conditions recur as produced the lesion in the first place. Still, the prospects of relief and cure of pyorrhea alveolaris are no less promising than those offered in the treatment of a majority of other lesions; they are just as favorable as when a carious tooth is filled, and are far more important. We cannot produce immunity, but we can effect a cure, and with the assistance of the patient a permanent result can be obtained.

When a patient presents for dental services we not only should fill the carious teeth, but, if there are any signs of pyorrhea, it is our duty to warn the patient of such conditions, and urge upon him the necessity of having proper treatment instituted for them. The time is not far distant when the oral cavity will be regarded by the medical and dental professions as an integral portion of the body, instead of being looked upon, as is so often the case today, as an entirely separate part.

DOUBLE RESECTION OF THE MANDIBLE.

By **H. P. PICKERILL, M.D., Ch.B., M.D.S.Birm., L.D.S.Eng., Dunedin, N. Z.,**
HONORARY STOMATOLOGIST TO THE DUNEDIN HOSPITAL; PROFESSOR OF DENTISTRY
IN THE UNIVERSITY OF OTAGO.

THE literature relating to the subject of double resection of the mandible for esthetic and orthodontic reasons is both small in amount and vague in character—at least that which is available to me at the present time may be so described.

LITERATURE ON MANDIBULAR RESECTION.

Angle, in "Malocclusion of the Teeth," quotes two instances—operators unnamed—of resection of the mandible undertaken for the correction of very pronounced cases, falling under his class III. One case was successful, and one resulted in the total loss of the mandible through necrosis. No details of the operations—other than that the methods were "crude"—are given, and there are no photographs or measurements indicating what the resulting advantage to the patient was from the one successful operation.

Arbuthnot Lane, in his brochure on "Cleft Palate and Hare-lip" (1905) refers to a case of open bite which he had treated by "cutting away a triangular area from the body of the lower jaw on each side," and photographs of plaster casts are reproduced showing a much improved condition, though it is somewhat difficult to understand from these how the result was obtained. The same author also refers parenthetically to—"other cases in which he had previously divided the lower jaw on either side." In each of these cases, apparently, the method employed for reuniting the bone was that of silver wire sutures.

That there are a number of cases of protrusion of the mandible accompanied by some real or apparent hypertrophy of the mental process which can be rectified only by active surgical interference is generally admitted; the same also applies in some degree to marked cases of open bite, though this latter may be remedied to some extent by excision of the occlusal surfaces of the molars, and by the provision of artificial dentures. As a general rule, however, since the patient suffers no pain from such conditions, and fails to appreciate his inability to masticate or to close his lips, the suggestion of an "operation" is listened to—and refused.

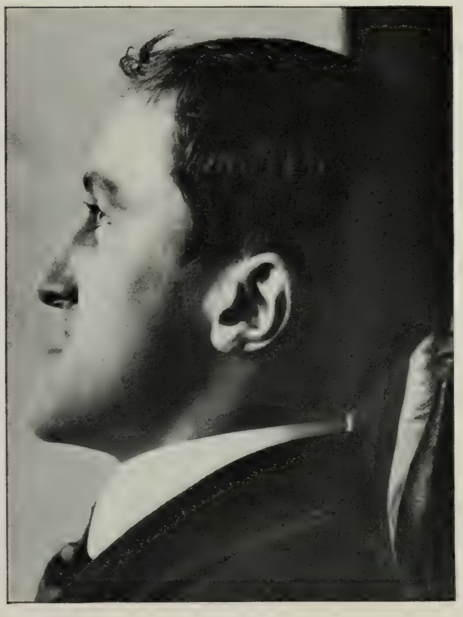
ETIOLOGY OF INFERIOR PROTRUSION.

As regards the etiology of cases of "inferior protrusion," there is nearly always marked discrepancy between the arches of the upper and lower jaws, the latter appearing much too large; but, as a matter of fact, the upper jaw is frequently at fault too, and is below the normal in size, so that to a certain amount of inferior protrusion is added a small amount of superior retrusion and restriction, thus giving rise to the characteristic appearance of a short, depressed upper lip, exaggerated naso-labial folds, and prominent chin.

I am inclined to think that these cases arise for the most part initially as a habit of thrusting the mandible forward, at about the age of six or seven years. Thus, during the eruptive period, the lower teeth, which erupt first as a rule, are occupying a slightly wider curve in relation to the corresponding upper teeth. Hence, when the upper teeth erupt, they strike the wrong lateral inclined planes of the occlusal surfaces of the lower teeth, and so get crowded inward and toward the center of the mouth. The resistance to this crowding causes a further expansion of the mandible and so the condition becomes exaggerated.

There are other cases, on the other hand, which appear to be wholly dependent upon an overgrowth of the bone of the mandible, from some undetermined cause, of which neither over-use nor hypertrophy of the pituitary gland appears to be a factor.

FIG. 1.



Profile of patient before operation. Note the very prominent chin, the disproportionately long mandible, and the marked naso-labial folds.

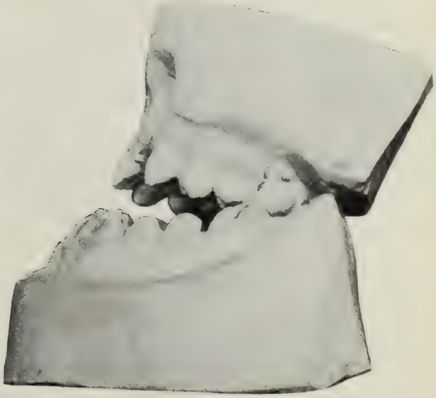
In June 1911 my colleague, Mr. A. J. Chrystall, sent to me a patient who was afflicted in a very marked degree with open bite and inferior protrusion.

HISTORY OF CASE.

The patient was a young man, eighteen years of age, and the condition had been present, as nearly as he could remember, for from eight to ten years. This was corroborated by his father. He had never been a very strong boy, and had some two years previously suffered from a severe attack of acute rheumatism, which had prevented his doing any work since. There was no family history of a similar deformity.

On examination, the patient was seen to be pale and rather thin; he lacked any "bulldog" appearance, caused usually by an underhung bite, on account of the associated open bite. His chin was, however, exceedingly prominent, the upper lip short and receding, and the naso-labial folds were exaggerated. He was quite unable to approximate his upper and lower lips. (See Fig. 1.) The metatarsal and phalangeal joints of both hands were slightly enlarged and misshapen, but there was no evidence of any change in the temporo-maxillary joint. He had some indication of mitral stenosis. The urine was normal.

FIG. 2.

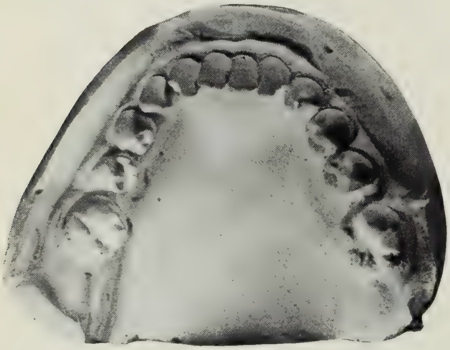


Models showing condition of occlusion before operation.

Upon examination, the teeth were found to be in an unsatisfactory condition. All the first permanent molars had been apparently lost by extraction many years previously, the four second permanent molars were very carious, and were either septic or had exposed pulps. There were numerous other smaller cavities in the other teeth. The two upper central and left upper lateral incisors had also been extracted some years ago. Of masticating area and incisive power he possessed absolutely none, the only points of occlusion being the distal cusps of the two molars on the left side. (See Fig. 2.) Those on the right side probably occluded originally, but caries having attacked both, there was a space between them.

The whole of the lower teeth were situated mesially to normal; they could hardly be said to be in mesial "occlusion." The lower incisors were very protruding and recumbent; that is to say, as a whole they were very much more forward than they should have been, but their incisal margins inclined backward, and must have been fully 12 mm. posterior to their apices. (Fig. 3.) The mean angle of their declination from the vertical was 43°, and the necks of the lower lateral incisors were 17 mm. anterior to the neck of the upper lateral incisor.

Fig. 3.



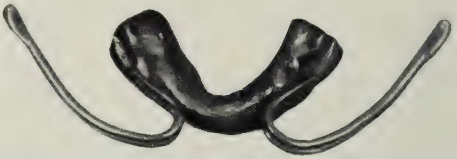
Model of lower teeth and jaw, before operation. Note the recumbent incisors and the diastemas in the bicuspid and molar regions. The molars are wrongly restored in amalgam as first molars; they are really second molars.

TREATMENT.

I decided that the only means of treating the case satisfactorily was by double resection of the mandible. The first step was to put the mouth and teeth in a healthy condition. This was intrusted to Mr. Saunders, who carried out the work very efficiently.

I determined to remove two sections from the first bicuspid region, in order to avoid injuring the mental vessels and nerves which normally emerge just below the apex of the lower second bicuspid, and so obviate any loss of sensation or blood return from the lower lip and chin. I further decided to do the operation in two stages, *i.e.* each side separately, in order to avoid cutting off the blood supply too severely from the central portion in a subject of obviously low resistance, my intention being to operate on the other side before bony union had occurred, but after the blood supply was well re-established. Subsequent events showed that this decision was wise. Having by measurements found the exact amount required to be removed, a German-silver splint was constructed for use during the operation, having two guides on it for the saw.

Fig. 4.



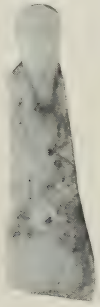
Kingsley splint used to assist in maintaining apposition.

OPERATION.

The first bicuspid on the left side having been extracted, a short incision was made in the skin, along the lower border of the jaw, and the bone was divided with fine saws subperiosteally. The section was removed downward. The two ends of the bone were approximated with some difficulty, held in position by interdental wire ligatures, and retained by a Kingsley splint, made of German silver, heavily gilded. (See Fig. 4.) Upon examination of the removed section, it was seen that the mental foramen was abnormal, that it was situated below the first instead of the second bicuspid, and that therefore the whole of the mental vessels and nerves had been hopelessly divided by the removal of the section. The section and the position of the foramen are seen in Fig. 5.

Unfortunately, despite all our care as to aseptic and antiseptic technique, prior to, at the time of, and subsequent to the operation, the wound suppurated. This is, of course, the rule, but I had hoped to avoid it, and think it might have been avoided in a patient of higher resistance. When the suppuration had quite ceased, the wound had healed, and the union had begun to get firm—that is, after about two months—the second operation was done.

FIG. 5.

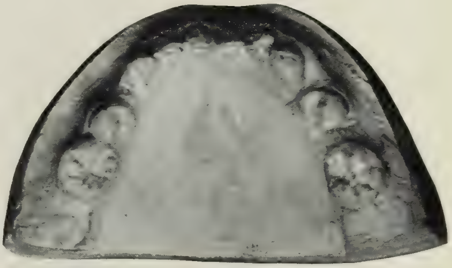


Section of bone removed from the left side, a similar piece being resected on the right. Note the position of the mental foramen.

The right side was treated in a precisely similar manner as regards the removal of the section, and showed, unfortunately, a similar abnormal position of the mental foramen, so that now the direct blood and nerve supply to the lip and chin had been removed. This was a result which could not have been foreseen, and, if it could have been, it is difficult to see how it could have been avoided, since a section in the canine region would be valueless.

The wound on the left side was opened up again, since I thought I could detect a slight separation of the bone at the lower margin. The divided bone on both sides was then wired with deep silver sutures from below, and fine interdental ligatures intrabuccally. In addition, the whole was secured by a Kingsley splint with a bandage passing under the jaw, which served to keep the dressings in position on the external wounds. For some days following, the lower lip and chin were considerably distended, owing to the obstruction to the return of lymph, and loss of sensation was complete. The former symptom rapidly disappeared, and the latter is not now very marked, at least the patient does not ordinarily notice it. I think, however, that had I inadvertently, by doing both sides at once, cut off the blood supply suddenly from the lip and chin before any collateral circulation had been set up, there would very possibly have been some sloughing of the parts, if not necrosis of bone in this particular patient. The wound on the right side also suppurated slightly, rendering it necessary to keep the splint on for a longer time than desirable, *i.e.* about two months.

FIG. 6.



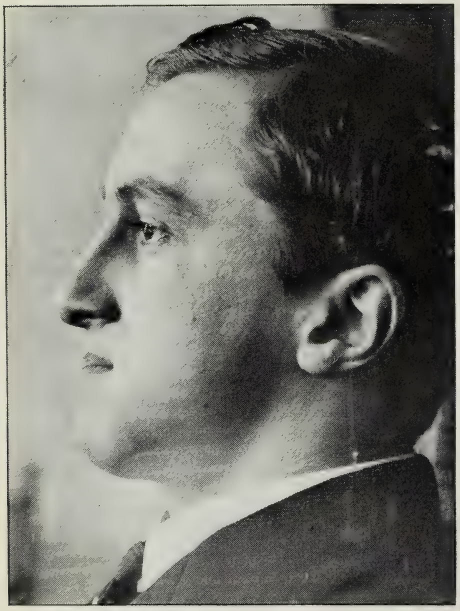
Model of the lower teeth and jaw after the operation of double resection.

When the splint was removed, it was found that some of the teeth were distinctly loose, doubtless owing to the long confinement under and the pressure of the splint. A very light metal splint was therefore made and was cemented to the upper half of the teeth, to give the peridental tissues opportunity to consolidate undisturbedly. Fig. 6 is a cast of the lower jaw before the small splint was applied.

RESULT.

The result from an esthetic point of view may be considered good. The operations have resulted in, I think, a considerable improvement, as may be seen by comparing Figs. 7 and 1. The patient's nose is now, as it should be, the most prominent feature of the face, the lips can be approximated in a normal manner, and the obviousness of the naso-labial folds has disappeared. *Per contra,* he has two scars below the jaw on each side.

Fig. 7.

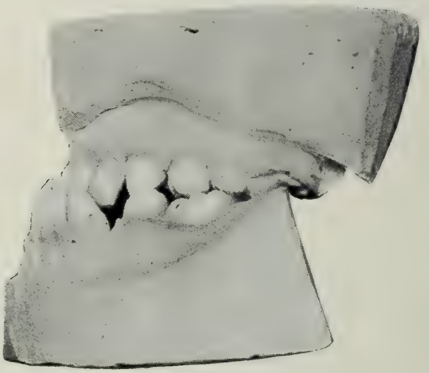


Profile of patient six months after operation.

From an academic orthodontic aspect the result is not perfect. Fig. 8 shows the present condition of the articulation; the patient is wearing a partial upper denture. The bite is still "underhung," but by no means as markedly as previously. The open bite has practically disappeared, partly owing to the interdental ligatures pulling the molars forward, partly to the lower incisors being now more elevated. (See Fig. 8.)

From the utilitarian and physiological point of view, the result has been excellent. The patient can now masticate his food, has improved in health, returned to work, and put on considerable weight. He now weighs thirty pounds heavier than he did when I saw him first, just a year ago. This latter fact alone points eloquently to the previous diminished absorption of nourishment resulting from the patient's inability to masticate.

Fig. 8.



Models showing the occlusion after the operation of double resection.

The following table shows the amount of diminution in size of the lower jaw obtained by the operation:

Measurements of Mandible Before and After Resection.

		Before.	After.	Diminution.
From distal surface of lower second molar to mesial surface of central incisor (cervix).	Left	47 mm.	39 mm.	8 mm.
	Right	49	41	8
From distal surface of lower second molar to symphysis 7 mm. below cervix of central incisor	Left	51	42.5	8.5
	Right	53	45.5	7.5
From distal surface of lower second molar to central incisor (incisal edge)	Left	41.5	36.5	5.0
	Right	43	39	4.0
Distance across plate from right to left second molars		34	29	5.0

REMARKS.

There seems to be no reason why this operation should not be more frequently performed than it is for the treatment of pronounced deformities of the mandible. The advantages from the point of view of personal appearance, restoration of function, and establishment of facilities for the absorption of food should always be considerable. It is, however, not an operation to be undertaken lightly or without the greatest care and thought. The technical difficulties are not inconsiderable. Two desiderata to which attention must be directed are: (1) Some device for directing and keeping the saw at the correct angle to the surface of the bone—not to the direction of the bone, for that is simple—since an exactly transverse section will not do in the first bicuspid region; (2) some satisfactory splint—the Kingsley splint requires too much pressure in inserting and subsequent to insertion. The device suggested by Angle I have considered, but rejected as unsuitable, first, because it relies on cement for adhesion, which in my experience cannot be satisfactorily obtained in such cases, in which there is, of necessity, blood and mucus in the mouth; second, because this device would not sufficiently control inward displacement, and the tendency to the latter is very great indeed; and third, because it would cover up and inclose a greater part of the wound and might thus prevent drainage. Arbuthnot Lane's plates and screws would be the most satisfactory means of reunion, if strict asepsis could be maintained from the beginning to the end of the treatment, but unfortunately, in stomatology this is an ideal which can by no means always be relied upon.

ORAL DEVELOPMENT IN THE PROGENY INFLUENCED BY THE BUCCAL TISSUES DURING PREGNANCY.

By ARTHUR ZENTLER, D.D.S., New York, N. Y.

(Read before the Section on Stomatology, American Medical Association, at its annual meeting, June 1911, at Los Angeles, Cal.)

IN 1899 I read before the Société de Stomatologie de Paris a paper proposing to show the influence of the state of pregnancy upon the buccal tissues in women in general, and especially in anemic women.*

ORAL SYMPTOMS NOTICED IN A WOMAN DURING THREE PREGNANCIES.

In order to illustrate my contention, I took the case of a woman, about twenty-five years of age, who, in her first pregnancy, gave birth to a seven-months child, who by extraordinary care was kept alive for ten months. During this pregnancy the woman's general condition was very unsatisfactory, the manifestations of poor general health being very evident in her mouth. Caries of the molars progressed with extraordinary rapidity; the gums were purple and sensitive, although very few deposits of calculus were present.

During the second pregnancy of this woman, at about the fourth month the gums around her teeth changed their natural aspect, becoming hypertrophied, and presenting here and there tumefactions, with a slight exudate in the beginning, which later assumed the general character of gingival abscesses, with a spontaneous discharge of a mixture of blood and pus. The teeth attacked by caries during the patient's first pregnancy were filled, but now not only were many of her other teeth decaying, but the ones that had been filled—though not very carefully—previous to her second pregnancy, began to decay around the fillings, the caries involving such parts of the teeth as are usually considered less vulnerable.

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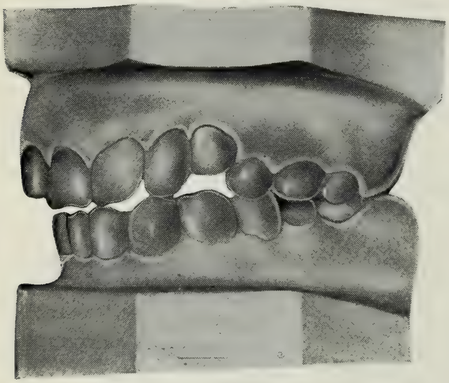
* "Une Observation à Propos de l'Influence de la Grossesse sur les Tissus Buccaux chez la Femme Anémique." (Published in *Revue de Stomatologie,* May 1899.)

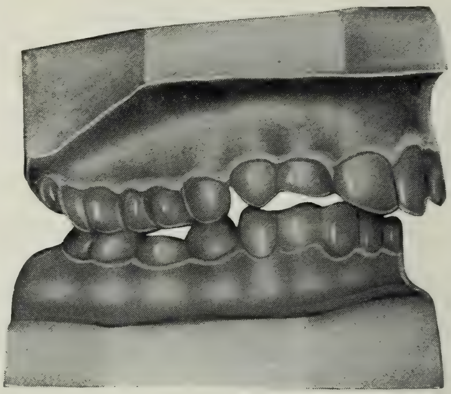
In spite of careful treatment of her mouth throughout this second pregnancy, this condition persisted until about the middle of the eighth month, when it began to subside, save for one single large pericemental abscess, which continued until after delivery. After the birth of the child the purulent discharge of her gums ceased gradually without any local interference. The tumefaction disappeared and the gums resumed their normal appearance, except around the cervix of the teeth, where they remained somewhat inflamed and less firm than normally.

Fig. 1.



L. B. (Age fifteen years.)

Fig. 2.



E. B. (Age twelve years.)

Two years later, when the patient was again pregnant, the same teeth which were affected during her second pregnancy became so very loose that she nearly despaired as to the possibility of retaining them, and much persuasion was needed to convince her that, with the exercise of due care in order to preserve her teeth until her delivery, they would probably regain their firmness—which actually occurred.

After the birth of the third child the tissues of the mouth, which during pregnancy presented the same manifestations as they had during the second pregnancy, were much slower in recovering, and manifestly this was due to the very anemic condition of the patient. In consultation with her physician, a treatment was prescribed directed toward improvement of her general tone, and especially toward the re-establishment of proper metabolism.

After very little local interference in the mouth, the patient was sent to the mountains, with instructions to keep in the fresh air as much as possible. Upon her return, two months afterward, she showed great improvement in her health; her gums were normal, and, while some of the teeth were still somewhat loose, they needed but thorough removal of the few deposits of calculus still present on some of the roots, and the keeping of the mouth in proper hygienic condition by the patient, in order to regain their natural firmness.

DIAGNOSIS.

This observation undoubtedly established the fact that any pathological conditions in the mouth, especially those involving the soft tissues and the ligament connecting the teeth and their alveoli with the soft tissues, have their etiology, if not entirely, certainly to a great extent in the general condition of the health of the individual; therefore this case was diagnosed as phagedenic pericementitis with a predisposition resulting from pregnancy, which by increasing the patient's state of anemia, diminished the nutrition of the alveolo-dental ligament.

FIG. 3.

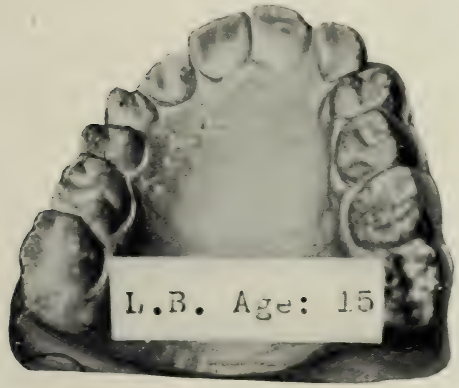
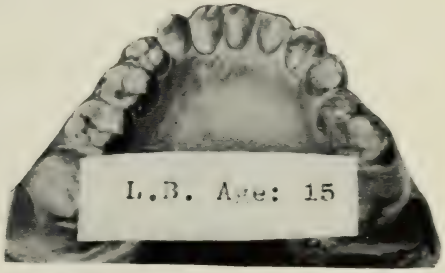


FIG. 4.



Note peculiar shape of upper arch; lack of upper left cuspid; lack of one right and one left upper bicuspid; under-development of upper right lateral incisor and cuspid; small size of lower arch; lack of lower left lateral incisor; lack of lower left second bicuspid.

FIG. 5.

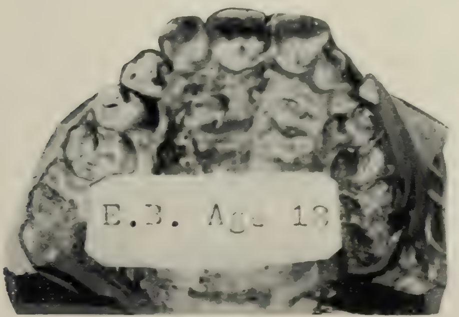
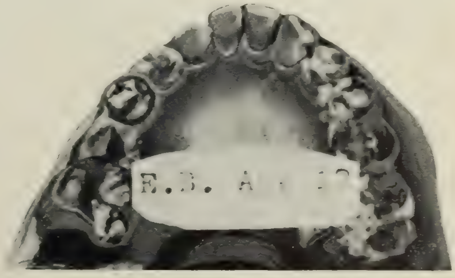


FIG. 6.



Note lack of development of left half of upper arch (25 mm. smaller than right half); lack of development of upper left lateral incisor; lack of development of upper cuspids; lack of development of all lower left teeth except central incisor and first bicuspid.

EFFECT ON OFFSPRING.

After having shown the relationship between the general health of this pregnant woman and her oral cavity, and having rationally established a diagnosis, it remains to show the influence of pathological conditions of the mouth during pregnancy upon intra-uterine life, and, if not otherwise, at least hypothetically, to comprehend the defective development of the children borne by this woman, as regards their teeth and the bones supporting them.

The osmotic phenomenon being closely related to the blood pressure, which depends upon nutrition, we may safely deduct that when nutrition is lessened, the osmotic phenomenon will not be at its best. From what little has been established about protoplasmic growth, we know that osmotic force is responsible for the multiplication of cells; when blood pressure is low, as in cases of defective nutrition of a part, the osmotic force will be lessened, consequently cell multiplication or growth is retarded or even arrested, depending upon the greater or lesser lack of nutrition, and the longer or shorter period of time during which this lack manifests itself.

Judging from the models (see Figs. 1 and 2) obtained of the mouths of the two surviving children in the case described, one of whom is fifteen, the other twelve years of age, it is, in my opinion, easy to see that retarded and even arrested development of the bones supporting the teeth and of some of the teeth themselves exists; that such portions of the mandible and maxilla and such teeth as are under-developed or not at all developed were affected in their growth because of the lack of blood pressure, due to want of proper nutrition of the parts, such lack of normal nutrition resulting from pathological conditions in the mouth of the mother at exactly that period of pregnancy when, embryologically, the specified bones and organs are known to be in process of generation and development.

The photographs of the models of the mouth of the fifteen-year-old boy (see Figs. 3 and 4) show not only a very peculiarly shaped upper arch, due, I believe, to arrested development, but also a lack of one cuspid and two bicuspids, which have never erupted, and a rather underdeveloped right lateral and cuspid. All this is present in this boy at an age when these teeth should be either fully or almost developed. The lower arch of this boy is exceedingly small; the left lateral is missing, and the left second bicuspid has not yet erupted, the deciduous molar not having been shed.

In the photographs of the models of the twelve-year-old boy (see Figs. 5 and 6) we also notice signs of retarded development in the incomplete eruption of several teeth which at this age should be fully erupted.

Unfortunately, it was impossible to obtain the permission of the parents of these children to secure radiographs of their maxillary bones, but, while such radiographs would be exceedingly interesting, they really could not prove any more than the accompanying photographs show in regard to under-development, because, even if we could establish through radiography that the teeth which are not erupted exist somewhere in the maxillary bones of these children, this would not change the fact of under-development and might change only to some extent the contention of completely arrested development.

When we keep in mind that no extraction, either of the deciduous or the permanent teeth of these children, was performed, and view the condition of their mouths with reference to the condition of their mother during her pregnancies, I believe that the cause and the result are related as contended in the title of this paper.

ORTHODONTIA IN ITS RELATION TO PYORRHEA AND ORAL HYGIENE.

By S. H. GUILFORD, D.D.S., Ph.D., Philadelphia, Pa.

(Read before the Susquehanna Dental Association of Pennsylvania, at its forty-ninth annual meeting, Wilkes-Barre, May 21 to 23, 1912.)

WHEN felicitating ourselves on the wonderful advance in dental science and art that has taken place within the past half-century we are not apt to stop and consider the relative advancement made by the several integral parts of our profession.

Some of these through scientific investigation and practical experiment have advanced more rapidly than others, and one of the most notable in this respect is Orthodontia, which may well be defined as the "science and art of restoring malposed teeth and arches to their normal position and relation, and the prevention of malposition by early oversight and anticipatory methods."

ORTHODONTIA A DEVELOPMENT OF THE PRESENT AGE.

As in the case of many other abnormal conditions, either local or general, to which the human body is subject, the full import of digression from normality on the part of the dental organs was not recognized by either parents or practitioners of a former age. The unsightliness of a disarranged dental apparatus was at first the only consideration which prompted the seeking of professional aid for its correction. That the deformity had any other significance than inharmony of feature and expression did not occur to them. Except in extreme cases mastication was satisfactorily even though somewhat imperfectly performed, and the child did not suffer from this cause.

It soon became apparent to the dental practitioner, however, that teeth in malposition were more readily attacked by caries owing to the greater amount of tooth surface in contact and the consequent increased opportunity for the lodgment of food débris. In addition to this the carious cavities thus formed were more difficult to fill properly, and even when cared for in the best manner caries was so frequently recurrent that it proved impossible to save such teeth for any great length of time. Thus the danger of loss was added to the mortification of disfigurement, constituting an additional reason for the correction of the condition.

ORAL NEEDS SUCCESSIVELY MET BY THE OPERATOR.

It was observed also that in cases of extreme irregularity or in the mal-relation of the maxillæ and mandible, enunciation was materially interfered with. To correct or obviate these unfortunate conditions mechanical appliances had to be devised, and the ingenuity of the dentist was called into play. Fortunately the necessity produced the means which, by improvement from time to time, enabled us to bring the teeth into normal relation without great difficulty and with little suffering or discomfort.

But even after the teeth, or rather the crowns, had been brought into proper alignment it was discovered that the roots had not moved in harmony with the crowns, and consequently there was no filling out of the hard and soft tissues surrounding the apical region. The position of the teeth had been improved, but the facial aspect was still faulty. To remedy this, means were soon provided that moved the roots in consonance with the crowns, and thus another advance was made by carrying the effects of mechanical force into regions hitherto inaccessible.

In numerous instances it was also observed that the lack of development of the bones in the facial region was associated with the presence of adenoids in the nasopharyngeal space, and that these through interference with nasal breathing had left the contiguous sinuses undeveloped. Through surgical removal of the adenoids, aided by suitable regulating appliances in the moving of the teeth, it was found that the entire dento-facial region could be developed into normal proportions.

This advanced step in orthodontic practice seemed to have brought about very nearly all that was necessary or desirable in the way of restoration of normal dental conditions, but it soon became evident that even more advancement could be made by anticipating the worse forms of malalignment and assisting nature to overcome the obstacles which she alone was unable successfully to combat.

EXPANSION OF THE ARCH.

The very reasonable thought occurred that inasmuch as the dental arches often did not expand sufficiently to afford room for the erupting permanent teeth, it would only be the part of wisdom to enlarge the arches by mechanical means, and thus afford room for incoming teeth to assume their normal places in the arch, rather than allow irregularity to proceed and later bring the teeth into position at a time when the difficulties of regulating them would be vastly increased.

Such is the accepted practice today, and through it a large amount of irregularity is in reality aborted or prevented. No feature of orthodontic practice has been followed by more beneficent results than this one.

In the lower arch, the conditions attending restoration of normal occlusion were less complicated, because there were no associated bones to be considered or changed in form or position.

REMEDYING MALOCCLUSION.

There was, however, one more difficulty to be met and overcome in which the lower arch was an important factor. It was a serious difficulty because it involved the relation between the teeth of both arches, and indeed the arches themselves. The teeth in each arch were often in normal and harmonious alignment, considered by themselves, but they were in abnormal occlusion. One arch was often in advance of the other by the width of a bicuspid tooth. Sometimes one arch was advanced, sometimes the other. Not infrequently all of the teeth in one arch were protruded beyond normal, while those in the other were retruded.

All of these conditions presented most serious difficulties in the way of restoration, on account of the magnitude of the task; but, as in previous instances of malrelation, the ingenuity of the operator was equal to the occasion, and a device both simple and effective was provided by which normal relations were quickly and easily established.

It is thus seen that, in the practice of orthodontia, each unfavorable condition thus far met with, no matter how complicated or perplexing, has been boldly met and conquered by the resourcefulness of those who devoted their energies to the task.

BEST RESULTS FOLLOW EARLY TREATMENT.

It must be granted, however, that the best results in this specialty have been attained at a time in the lives of the patients when their youthful condition offered the best facilities for success. Where dental irregularity has been unheeded and no remedial efforts have been brought into play until some years after maturity, the prospects for successful treatment are far less promising. Not only this, but serious results frequently follow the failure to bring about normal occlusion and relation early in life. Many important teeth are lost in middle life or later simply through continued malposition. Nature has designed that the human teeth should be placed in the position which we call normal, not only for purposes of efficient mastication and articulation, but also to insure their longest retention and efficiency. To this end they touch each other for mutual support, but only at minute points, which fact also tends to lessen their liability to decay.

Moreover, in their normal positions they are best qualified to sustain the force applied in mastication, which is largely exerted in a vertical direction; whereas when the teeth are in abnormal positions such forces are applied in directions not intended, and which they are not adapted to resist. Under this continued misapplication of force the teeth are apt to be driven into greater malposition, contact is lost and space created, with the consequent train of evil results.

IMPORTANCE OF NORMAL TOOTH CONTACT.

Dr. Black in one of his recent papers has clearly and forcibly pointed out the important part played by normal tooth contact in protecting the delicate tissues of the septal space from injury by impact of food, and has shown the necessity of keeping these tissues in the most perfect condition of health in order that they may subserve their purpose of tooth preservation.

When teeth, especially in the buccal region, are in lingual or buccal malposition, the tissues of the septal space are not protected as they should be, but are exposed to the continued impact of food, which not only produces irritation but forces foreign matter between the gingival tissue and the root, breaking up their connection and forming a depression or pocket, which in nearly all cases is the initial factor in the causation of that dread disease, pyorrhea.

Dr. Black also points out how diseased tissue or a pus pocket will often cause a tooth to move away from the diseased side and leave its position in the arch, thus producing malposition and malocclusion. If this be true, as it undoubtedly is, the converse is also true, that malposition of a tooth or teeth will often produce or eventually lead to the establishment of distinct pyorrheal conditions.

We have all noticed that after a number of the buccal teeth have been lost, through neglect or unskilful operations, the burden of mastication is thrown upon the anterior teeth, so that those in the upper arch move labially and spread, leaving the interdental tissues exposed to the very influences which are responsible for the beginnings of pyorrhea. Teeth thus lacking mutual contact and support become loose in time, and their movement in the alveoli helps to irritate both gingival and subgingival tissues, thus still further aggravating the existing unhealthful condition. This is well proved by the fact that loose teeth affected with pyorrhea cannot be cured of their disease unless they are splinted to prevent movement.

The intimate relation existing between malposed teeth and pyorrhea seems to have escaped the observation of those who have made either condition a matter of study and observation, and yet the relation is very real and most important, so that in dealing with one we cannot overlook the other.

All this furnishes an additional reason for the correction of tooth malposition before its injurious effects have progressed so far as to threaten the loss of the teeth themselves.

With the frightful ravages of pyorrhea visible on every hand and steadily increasing, with which we have at best been able to contend with only partial success, it behooves us to seek out all of its causative factors in order that preventive treatment may be resorted to and the disease checked.

ABNORMAL POSITION OF TEETH IN ITS RELATION TO MOUTH SANITATION.

If teeth in abnormal position are often responsible for the inception of pyorrheal conditions, so also does malposition largely interfere with mouth sanitation or "oral hygiene." Teeth normally placed, with their small contact points located near their occlusal surfaces and the large divergent interproximal spaces above, are in the very best condition for minimizing the amount of food that may find lodgment there, and also for its removal by the action of the tongue, cheek, and saliva.

Any alteration of this arrangement by tooth malposition is opposed to nature's plan, and increases the difficulty of keeping the teeth and mouth in a clean and sterile condition.

Constant observation has shown us the difficulty of obtaining and retaining sanitary conditions in the oral cavity even when malposition is not a factor. How difficult and almost hopeless, therefore, must be the task when unfavorable conditions are present to complicate the situation.

It is all very well to urge the importance of oral hygiene, and to instruct our patients in the way of bringing about and preserving the condition of mouth cleanliness, but it would seem equally to be our duty to see that no unusual conditions are present to interfere with the attainment of the desired end.

With children and the young, who naturally are the first to be considered in connection with the oral hygiene movement, because much the greater part of their lives is before them, let us see to it that at as early an age as possible their teeth are so placed as to make the care of them both easier and more successful.

This is being looked after to some extent by those who have inaugurated and those who are carrying forward the oral hygiene propaganda in the case of school children and the poor, but it is altogether probable that the importance of this phase of the subject will not be readily perceived by the local authorities who provide the means for dental inspection and care. In time they will realize it, and we may then hope for more liberal provision than has yet been made, so that skilful orthodontic treatment may be available in the large proportion of cases that require it.

GENERAL ANESTHETICS—CAN THE DENTAL SURGEON USE THEM TO ADVANTAGE IN DAILY PRACTICE?

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I AM deeply conscious of the honor you have conferred upon me, grateful for this opportunity of addressing you, and sincerely hope that you will not be disappointed in the message which I bring.

Although a member of the medical fraternity, I am proud of the fact that I am also a dentist. My acquaintance with medical men is extensive, I am somewhat familiar with the members of the bar, and have a slight familiarity with the clergy, but I know of no profession or class of men that is more earnest, more diligent, more conscientious, or is accomplishing greater results for the human race than is the dental profession.

ACHIEVEMENTS OF THE DENTAL PROFESSION VS. THOSE OF THE MEDICAL PROFESSION.

We become discouraged at times and feel that we are not making the success that we should make in the work of our choice, but let me assure you that no other specialty of medicine begins to measure up to the high average of efficiency obtained by the dental surgeon.

By means of fillings and inlays we check the ravages of dental caries, and restore lost tissue to its normal contour. Irregularities of the teeth are corrected; crowns more shapely and enduring than the original ones are placed upon roots made healthy; missing teeth are replaced by bridges and plates, and prophylaxis bids fair to thwart pyorrhea—magnificent achievements as compared with the results obtained by the medical man.

The general medical practitioner labors assiduously to bring us through scarlet fever, smallpox, pneumonia, typhoid, and other diseases—to be carried to our graves later by tuberculosis or cancer. It is discomforting to know that one person in every seven dies of tuberculosis.

Is it not astonishing that one woman in every eight dies of carcinoma, and that one man in every eleven dies of carcinoma? Compare the results and see how much more scientifically we as dental practitioners have overcome the obstacles in our path, and how much more successfully we are performing our mission than the general practitioner of medicine and the general surgeon. Let us thank God and take courage, as we are making good in what we have undertaken.

It is not my intention on this occasion to dwell upon the achievements of the dental profession; in passing, however, I cannot help calling your attention to the fact that, if the dental profession should be annihilated—wiped out of existence between now and tomorrow morning—we have already to our credit an achievement more lasting than granite or bronze, and one which will endure as long as the human race shall exist.

Anesthesia—the greatest boon ever bestowed upon our suffering race—is the gift of Horace Wells, a dentist, and humanity's foremost benefactor. Another dentist, Morton, discovered the anesthetic properties of sulfuric ether. Anesthesia has made surgery possible, and as dentistry contributed anesthetics to the sum total of the knowledge of the world, that should be glory enough to make every dentist proud of his profession.

PAIN, THE PATIENT'S BUGBEAR.

The nature of our work is such that we are almost constantly inflicting pain from the time we enter our offices till the hour of closing. Patients sitting in our chairs suffer both mentally and physically, the one augmenting the other. Were it not for this dread of the dental chair, three or four times as many dentists as now would be required to meet the demands of the public.

Recently the head of a large dental manufacturing house in Philadelphia informed me that, after a thorough investigation, he had ascertained that in this country only 8 per cent. of the population were regular attendants upon dental offices, and that from 40 to 50 per cent. were amply able to pay good fees, and the problem with him was how to interest these 40 to 50 per cent. to the extent of caring for their teeth, in order that he might increase the sales of his products. I asked him if he could explain why so large a percentage of those who are financially able to pay dental bills did not avail themselves of the services of the dental profession, and his answer was, that the pain inflicted during the proper execution of dental work was the only reason.

While we have wrought well what we have undertaken, and surpassed other specialties in medicine in the efficiency of our results, yet it is a sad commentary that four-fifths of the dental work that should be done for the comfort and the improvement of the race remains undone, because our methods are so unhumanitarian as to exclude this vast army of our fellowmen from availing themselves of dental service.

As we grow older in practice, our sensibilities become deadened, and the almost constant effort which we put forth to impress upon our patients the fact that "This will not hurt," results in our assuming ourselves a state of auto-hypnotism, and we come to believe that the outcry on the part of the patient is only a whim and not real. There is an expression in France; "He lies like a dentist."

EFFECT OF PAIN UPON THE NERVOUS SYSTEM.

We cut into living tissue, lacerating the nerves themselves—performing laparotomies, so to speak, on the teeth—and the anesthetic usually employed is that of witty speech or an amusing story, while the patient suffers, cringes, agonizes almost to the state of collapse.

The dental surgeon does not seem to realize the extent to which the nervous system is impaired as the result of operations on the teeth. During long operations, even though they be not very painful, and in direct ratio to the pain inflicted, the nerves become exhausted, and a condition is present which I would denominate dental fatigue, bordering on collapse or shock. Exhaustion of the vaso-motor centers, rather than structural lesions, produces shock, and the fact should be emphasized that it is a dangerous procedure to submit even the physically strong to intense pain beyond certain limits.

It is not necessary in this connection to spend even a moment's time in pointing out how much we, as a profession, have added to the neurasthenia so prevalent at the present time; how many nervous systems have been permanently shattered in the dental chair; how many children have been born into the world nervous wrecks, because of the mother's breakdown during dental sittings. Fortunately, however, conditions are not as bad as they used to be in the days of Marshall H. Webb and E. Parmley Brown. I have seen these men operate on strong male patients who were being fed whiskey through a tube during the operation, in order to maintain their strength and mental powers during the from five to seven hours of operating for building up teeth from the gum margin and restoring them *in toto* with cohesive gold foil.

SURGICAL SHOCK.

The general surgeon administers anesthetics primarily to prevent pain and to avoid shock; secondarily, to facilitate operating. Prior to the general use of anesthetics, deaths were frequent in simple arm and leg operations, while now, under anesthesia, one seldom hears of a death during these operations. It was shock that killed these patients. Thousands of brave soldiers in the civil war died on the field of battle, before medical assistance could reach them, not because any vital part was entered by shot or shell, but from shock resulting from intense pain of long duration. Anesthetics are equally valuable in dental operations, from their preventing fatigue and shock. Under the benign influence of anesthesia, physical suffering is prevented, mental torture obviated, the patient steps from the chair without fatigue, and an otherwise restless night becomes one of repose and refreshment.

It is not my intention on this occasion to enter into a discussion of surgical shock, but rather to apply it, referring to it only in passing.

Shock is depression. We have depression of the respiration, or respiratory shock; depression of the circulation, or circulatory shock. The causes are numerous, but they act in each case by stimulating the afferent nerves, and if these nerves be stimulated too suddenly, too frequently, too painfully, too forcibly, or too long, shock results.

Shock, then, may be defined as a condition of depression produced by exhaustion of the medullary centers controlling respiration and circulation by a too sudden, too frequent, too painful, too forcible, or too prolonged stimulation of the afferent nerves, the afferent nerves being those which carry impressions from the periphery to the brain.

SHOCK IN DENTAL OPERATIONS.

Let us take a tooth for the purpose of practical illustration. The patient is in the chair, the rubber dam adjusted. We touch the switch, the bur revolves. When the bur is placed against the tooth or in the cavity of the tooth, and the patient turns pale and breaks into perspiration, what has happened? In all probability, the too sudden stimulation of the afferent nerve is exhausting the nerve centers that control respiration and circulation, and, if the bur were applied longer, loss of consciousness might ensue, with cessation of breathing, or of circulation, or both.

In some patients this first application might not cause any disturbance whatever, but by a too prolonged application of the bur, the afferent nerve may be stimulated, the same symptoms may make their appearance, and, unless the instrument is removed, shock may supervene.

Many times have we seen our patients push the head as far back as possible in the head-rest, while the bur is being pressed hard into the sensitive dentin to remove carious portions or for the purpose of proper cavity preparation; if we go too far, and stimulate the afferent nerves to medullary exhaustion, shock symptoms are observed.

Again, if a cocain application is made to an exposed vital pulp for the purpose of its immediate removal, and after waiting the usual time a broach is thrust suddenly into the pulp tissue, but on account of inflammation the cocain has not been absorbed, the afferent nerves are stimulated too suddenly and too forcibly, and as a result a blanching of the mucous membrane is liable to occur; the pulse is rapid, but weak; the blood pressure is low; the temperature below normal; the skin cold and clammy; there is increased perspiration and respiration; the pupil is somewhat dilated and responds feebly to light. These are the conditions we find present in shock to a greater or less degree.

Exhaustion of the vaso-motor centers, rather than structural lesions, produces shock, and no operator can tell just at what point the medullary centers can no longer bear the strain, and succumb. It is very evident, then, that the central nervous system is involved in the slightest operations on the teeth, and, even when the ordeal falls short of producing symptoms of shock, the general nervous system becomes involved.

Shock can be divided into two groups, *i.e.* physical and psychical. The conditions just considered arise from physical causes; now for a moment, let us see what we mean by psychical shock.

PSYCHICAL SHOCK.

Psychical shock refers to affections caused by mental impressions. In this class of patients, fear or dread of the operation is the etiological factor to be dealt with.

Not long ago, a patient to whom I had just administered an anesthetic for the extraction of a tooth told me that on a former occasion, while sitting in a dental chair, the dread of having a local anesthetic used was so terrifying that before the dentist had time to make the injection she fainted.

As far as the central nervous system is concerned, the effect is the same regardless of whether the afferent nerves be stimulated by actual pain or only by dread or fear. When we tell our patients, in order to quiet them, "It's all in your mind," the expression is true, though not in the sense in which we mean it.

If the pain inflicted in dental operations is located in the central nervous system, and the disturbances resulting from dread and fear likewise affect the central nervous system, then it is the *central nervous system that needs our attention,* and this can only be reached by a general anesthetic. A local anesthetic could, at most, be *only half-way effective*—preventing disturbances of the nervous system by overcoming the physical causes of shock, while the physical or mental causes would still be operative.

PHYSICAL AND PSYCHICAL SHOCK OVERCOME BY GENERAL ANESTHESIA.

That is why I advocate the use of general anesthetics in all those cases where the dental operation in question is sufficiently painful, or the dread of the operation is sufficient, to impair the central nervous system, either physically or psychically stimulating the afferent nerves.

Believing, as I do, that general anesthetics should be employed when the pain in dental operations is severe enough to stimulate the afferent nerves to such a degree as to result in one or more shock manifestations, and when the fear or dread is sufficient to produce these manifestations, in my opinion we are confronted with a condition more dangerous and far-reaching in its results than the effect of the anesthetics which I recommend for these cases; in other words, it is more detrimental to the patient to operate in such conditions without an anesthetic than with one.

ANESTHETIC AGENTS EMPLOYED.

Having arrived at this conclusion, it is next in order to consider briefly the anesthetic agents applicable in these conditions. Before doing so, however, let us pause a moment in order to inquire as to how anesthetics act, or what they do to better the operative conditions.

Any force, influence, or drug that will soothe the fibrils of the nerves so that they will not send painful impressions to the brain will be suitable—provided, of course, that it is not of a dangerous nature, or used in dangerous quantity or intensity. Suggestive therapeutics, a small amount of nitrous oxid, nitrous oxid and oxygen, ethyl chlorid, somnoform, or chloroform vapor will produce these results.

MENTAL SUGGESTION.

Suggestion is a powerful factor in the condition which we are considering, and it is almost beyond belief what results can be obtained by this means. If the patient is set in a proper frame of mind, and his fear is dispelled, anything that the operator wants him to see and feel can be suggested so strongly that he will see and feel it.

Christian Science, New Thought, mental healing, and other cults of this nature are the results of enforced optimism.

Some persons by constant practice, have acquired the habit of moving their scalps backward and forward, others of wriggling their ears like a mule, while others, with equal celerity, have learned to throw their cerebral hemispheres out of gear, to exercise the power of inhibition and shut off pain from certain parts of the body, much the same as the electric lights in one room of a house can be extinguished at pleasure by turning a switch, while the lights burn brilliantly in all the other rooms.

Some Christian scientists have practiced that form of nerve inhibition which their belief calls for, till the end-organs no longer telegraph the pain sensations to the upper levels of the brain, in which is located the seat of consciousness. The Christian scientist has learned to do as the auto-hypnotist, viz, overcome or prevent pain by nerve inhibition.

Though we are not capable of instructing our patients how to use auto-hypnotism, or to overpower them with suggestion in all cases, or to teach them the art of inhibiting pain by throwing their cerebral hemispheres out of gear, we can obtain the desired results by the use of nitrous oxid and oxygen, ethyl chlorid, somnoform, and chloroform vapor.

Many patients are so susceptible to suggestion that they yield readily to this influence. I have learned from experience that sensitive cavities can be prepared, and even teeth extracted, by simply placing an anesthetic inhaler over the nose and mouth of some patients without a particle of any anesthetic. Others not so susceptible can be influenced by sprinkling a few drops of eau-de-Cologne on the gauze within the inhaler. The fact that we are really doing something to alleviate suffering, with words of encouragement, suggesting as the patients inhale: "Now you will not mind this; there will be no pain," often has a magic effect.

But, if we are not sufficiently occult to obtain the desired results in the manner described, then we can succeed admirably by using suggestive therapeutics in conjunction with the anesthetic agents already mentioned. We can obtain the desired results with these agents without suggestion, but by combining suggestion the same results can be obtained very much more quickly and with a smaller quantity of the anesthetic.

DETAILS TO BE CONSIDERED IN THE ADMINISTRATION OF GENERAL ANESTHETICS.

Before further considering anesthetic agents, we will diverge a moment in order to call attention to some details that, in my estimation, are as important and essential as the anesthetic itself, as a means of success.

Confidence. If an operator is not accustomed to administering anesthetics, he will probably be more frightened than the patient, in the beginning of his career as an anesthetist. If he is, he should conceal his feelings. For if the patient discovers the operator's lack of experience either by the tone of his voice, or by a glance at his face, or by uneasiness or nervousness on his part, failure will result. He should act as if administering an anesthetic were the pleasantest thing in life. Doubt, uncertainty, or timidity on his part will be communicated psychically to the patient, and the operator cannot have a full measure of success until he can comfortably and fearlessly stand in the presence of the patient. When he becomes masterful and is able to inspire confidence in his patients, the battle is won.

Preparing the patient. A preparatory or resting room should communicate with the operating room. In this room the assistant should prepare the patient, and, in the case of women, always loosen the bands about the waist-line and neck. If we would take this precaution for all sittings exceeding thirty minutes, even when no anesthetic is to be administered, patients would not become so exhausted and fatigued. The bladder should be evacuated just before the patient takes the chair.

The assistant. Success depends largely upon the capability of the assistant. A thoroughly trained assistant means three-fourths the battle. The assistant should be a cool, level-headed woman, physically strong, non-excitable, quick of thought, and keen of observation. She should know anesthetic symptoms, understand all resuscitation measures and how to apply them, and be thoroughly interested in the work. While preparing the patient, such an assistant, if she understands her business, can talk the most nervous patient out of her nervousness. She should maintain a light conversation, which will keep the mind of the patient off the operation. She should mention a number of pleasing cases, especially those that occurred among the patient's acquaintances, if possible. She should laugh with them, since there is nothing like a laugh to make one feel at ease. If the assistant is what in the language of the street is called a "jollier," she will set the patient in a good frame of mind by the time her clothing is arranged for the administration of the anesthetic. I have known patients to go into the dressing-room white with fear, and step out into the operating room quiet and tranquil from the influence exerted by the assistant. While the operator is administering the anesthetic, the assistant should stand on the left of the chair. When he is ready to operate, she must watch the patient for him. If nitrous oxid and oxygen is being used, she sees that the nasal inhaler remains in position, maintains the proportion of the anesthetic conducive to the best results, and relieves the operator of these responsibilities. If somnoform or chloroform is being used, she maintains the anesthesia or analgesia at the proper degree for operating, holding the bottle or the appliance in her hand, and when the operator is changing burs, or seeking an instrument, holds the anesthetic while the patient inhales the desired amount. If the case is one of extraction, and more than one forceps is to be used, she must have ready the other instruments in the order in which the operator needs them. She must see that the lower lip is not pinched, that the tongue is kept out of the way; that the cheek is distended; that the mouth-prop is removed at the right moment in multiple extractions; that roots, teeth, or blood do not go down the throat. She must sponge the parts, lean the patient forward when necessary, be equal to any emergency that may arise, and perform all these functions without being told. Just in proportion as the assistant does these services well for the operator will he be successful. The poorer the assistant, the more of her work the operator will have to do, and the greater will be the chance of failure. With such an assistant as I have described, the operator can devote his entire attention to the operation.

REQUISITES OF A GENERAL ANESTHETIC.

The requisites of a good anesthetic are as follows:

(1) Safety. (2) Pleasantness of administration to the patient. (3) Easy and rapid production of effect. (4) Easy and rapid recovery. (5) Freedom from dangerous and disagreeable after-effects. (6) Simplicity of administration.

CHOICE OF THE ANESTHETIC.

The anesthetic agents recommended for such operations as we have under consideration are—Nitrous oxid and oxygen. Somnoform. Chloroform vapor.

If safety were the only requisite, nitrous oxid and oxygen would always be employed, because this combination shows the lowest death-rate. If simplicity of administration were the test, chloroform would be the choice, because no apparatus is necessary for its administration. If ease and rapid production of effect, and easy and rapid recovery, were the test, somnoform would be sufficient. For brief operations, somnoform is admirable; for very prolonged operations, nitrous oxid and oxygen is indicated. If nitrous oxid and oxygen could be administered as easily as somnoform and chloroform, no other anesthetic would be needed for any purpose.

As to safety, with due precaution, I do not believe that one assumes very much risk in using any of the anesthetic agents named, if they are properly administered. Nitrous oxid and oxygen has been administered frequently for many years, and only two or three deaths from this agent have ever been reported. Somnoform, with over two million administrations, has a record of four deaths during the administration, but no one claims that the anesthetic was at fault. Chloroform used in the manner described has no death record, so far as I have been able to ascertain. Each of these anesthetic agents has its special advantages, which can be appreciated only by actual administration and comparison of results.

PROCEDURE OF ADMINISTRATION.

Now let us return to our patient, a woman being selected for our hypothetical case. The assistant has prepared the patient both mentally and physically as has been previously described, and placed her in the operating chair. The rubber dam is adjusted, and, if the case requires preparation of a sensitive cavity, the operator proceeds as usual to break down the enamel walls with chisels, assuring the patient that there is nothing to dread, that she will not be unduly hurt, and as soon as she feels pain to any great extent she will be asked to inhale the anesthetic. The carious portions are removed and all the work possible is done before it is necessary to use the anesthetic agent.

If the patient really dreads the anesthetic, in spite of all reassurances, this attitude of mind makes her hold out till the last moment before she will admit that sufficient pain is being felt.

When the patient says: "I think you had better begin now with the anesthetic," the mouth-prop is adjusted, if using nitrous oxid and oxygen, or somnoform, and the anesthetic started. The patient is given to understand that, if pain is felt, the lifting of her hand is the proper signal. The anesthetic is administered till the patient becomes a little groggy or dazed, when the eyelids close lazily; then the cutting is begun gently, and increased if no evidence of pain is shown. If the hand is raised, or the facial expression indicates pain, a few more inhalations are given. It is seldom necessary for the patient to lose consciousness. The operator asks: "Am I hurting you?" "Do you mind what I am doing?" "Do you feel pain?" "Are you asleep?" Patients can be kept in this condition when desired, with the agents mentioned, and they are wide awake in a minute or two, leaving the chair buoyant and pleased.

The object in asking questions that require an answer during this stage is that the operator can judge by the way the reply is made as to the depth of analgesia or anesthesia obtained. If no reply at all is given, the anesthesia is deeper than necessary. A "Yes," or a "No," drawled out in such a way as to indicate that the patient has no interest in the matter shows that the proper moment for operating has been reached, while a quick, intelligent "Yes" shows that more of the anesthetic is needed. If the hand begins to be raised, this signal, as has been explained, should be respected.

When anesthesia is being induced, perfect quiet must be maintained. No talking or whispering should be tolerated, and no words spoken except those of suggestion to the patient. Some patients do not lose entirely the sense of hearing; sounds are exaggerated under the influence of anesthesia, and an ordinary tone of voice may sound very loud and disquieting. For this reason, all suggestions to one undergoing anesthesia should be made in a quiet, firm, subdued tone of voice. I speak not a word to anyone in the room while inducing anesthesia, except to the patient, conducting all communications with the assistant by means of signals. This quiet should be maintained until patients return to consciousness.

This is the technique or *modus operandi,* no matter what the operation may be. Of course there is an individuality about each of these anesthetic agents, and each must be administered according to the laws governing it, but as nearly as I can possibly do so, and in general terms, the method just explained is applicable to nitrous oxid, nitrous oxid and oxygen, somnoform, ethyl chlorid, and chloroform vapor.

There is also an individuality about each operator, and their methods of procedure might widely differ, for probably no two men would employ identically the same technique.

PRACTICAL CASES.

A few practical cases of analgesia may be profitably cited:

Case I. Mrs. H., a stout lady of about sixty years, almost as broad as tall, weighing about 200 lbs., and a patient in whom chloroform would ordinarily be contra-indicated. She remarked, "I have four teeth to be extracted, and I knew that you would not give me chloroform, so I brought it with me; and this is Miss K., a trained nurse, who will administer it."

I placed the patient in my chair and told her that she must either take the chloroform in my way—*i.e.* by the Hewitt method—or not at all. I poured about three drams of chloroform from a pound bottle into an empty morphin bottle, the one presented to me by Dr. Hewitt, and which was used by him in the presence of the Iowa Committee. The patient seeing this laughed heartily, saying that it would require the entire contents of the large bottle to put her to sleep. I held the bottle at some distance and gradually brought it closer and closer to her nose, and she took about twenty inhalations. I extracted the four teeth without her feeling the slightest pain.

As she leaned forward to free her mouth from blood, she remarked, "Why don't the doctors give it this way? I have taken anesthetics twelve times for various surgical operations, but if I ever have to take an anesthetic again, even if I should be in New York city, I am going to send for you and have you give it this way."

Case II. Dr. Wolf of Washington, D. C., told me that on one occasion, a tall, gawky, raw-boned, awkward specimen of humanity came to his office for the extraction of a tooth. He placed him in the chair, procured a forceps, and just as he was about to operate, the patient said, "Just a moment, please," drew from his pocket a small bottle, and took several inhalations. "Now you may proceed," he said, and opened his mouth. The tooth was extracted painlessly. The bottle contained chloroform. The patient was Abraham Lincoln, then President of the United States. The fund of knowledge which that man possessed has been one of the mysteries of the ages.

Case III. Miss A., a school teacher and extremely nervous from work in the schoolroom, presented for the removal of the pulp in the upper right second bicuspid. It was simply impossible in this case to operate without an anesthetic. The mouth-prop was adjusted, nitrous oxid and oxygen used, and the pulp removed without discomfort. The patient had seen two dentists that morning who had failed in their efforts at pulp exposure for devitalization. This patient left the office stimulated, and not exhausted as she had been on all former occasions when leaving the dental chair. At subsequent sittings a number of cavities were prepared painlessly for fillings under nitrous oxid and oxygen analgesia.

Case IV. Mr. B., a robust banker of about forty years, in whose mouth a bridge had been placed several years previously, came from the office of his dentist, who had failed to relieve the condition. One of the abutments, an upper molar, had not been devitalized. The pulp had died in the meantime, infecting the periapical tissues, and it was recessary to remove the bridge. These conditions are usually as painful as any that the dentist is called upon to treat. The slightest touch of the bridge was simply unendurable. Nitrous oxid and oxygen was used in this instance. The crowns were slit, the bridge was removed, and the pulp chamber of the molar entered for vent and drainage. The operation was painless, about four minutes being required.

Case V. This case was treated at the clinic in our college. The patient was a young man of about twenty years, studying in the State Agricultural College forty miles distant. Five gingival cavities in the lower anterior teeth were noted. The cavities were of such depth that the pulps would have died under any kind of a filling. The teeth were so sensitive that touching the cavities brought tears to the patient's eyes. The cavities extended below the gum margin, making adjustment of the rubber dam difficult, if not impossible. What can one do in such cases? Somnoform was administered to the degree of anesthesia, large openings were made into each of the pulp chambers with a bur, and each pulp bled freely. The patient did not know what had been done; no pain was experienced. As this was a clinic case, the student assigned to this case removed the pulps with the aid of cocain, and filled the root-canals. The anesthesia lasted an ample period of time to have removed all the pulps with a broach.

Case VI. Three or four years ago, at the annual meeting of the Nebraska State Dental Society in session at Omaha, Dr. Frank Hetrick called me to his chair, showing me a case. He was trying to prepare two cavities in the approximal surfaces of the upper central incisors for fillings. These teeth had become so sensitive that it was impossible to proceed farther.

The patient, a dentist residing at Lincoln, gave the following history: "My teeth are so sensitive that no one has ever been able to make a satisfactory cavity preparation. At our state society meeting last year I sat for four hours, with the rubber dam adjusted, trying to have a cavity in an upper molar prepared for an inlay. Cocain, eucain, pressure anesthesia, all failed, and it was necessary to fill the cavity with cement."

I said, "Do you object to taking a few inhalations of somnoform; if you will take it, the cavity preparation will be completed painlessly."

He replied, "In my case that is impossible, but I am willing to try anything."

The agreement was that, if he found that he was being hurt, or thought that he was going to be hurt, he was to raise his hand. I gave him two or three inhalations of somnoform, and signaled Dr. Hetrick to begin. He cut the tooth quite extensively, and the patient started to raise his hand. Someone said, "Are you being hurt?" He replied, "No, and I do not want to be hurt." I gave him two or three more inhalations, and the preparation was completed in such a way as Dr. Hetrick wished it to be, and not more than two minutes' time was consumed.

The patient turned to me and said, "Doctor, there has not been a particle of pain, and I would go to Europe, if necessary, to have that used on me in future dental treatment."

CONCLUSION.

Does it not seem cruel, inhumane, barbarous, that the dental profession almost unanimously continues to inflict such suffering when so simple a means is at hand to prevent this torture?

It is true that much of the supposed pain in dentistry is imaginary, purely mental, but that does not make it any easier for patients. It is real to them, and even the anticipation of being hurt disturbs the equilibrium of the nervous system. Anesthetics are of inestimable value to this class of patients. It is worth while to employ anesthetics in such patients, if in no others, because they consume the greater portion of the operator's time as well as strength. How often do we feel completely exhausted after performing some simple operation in nervous, hysterical patients, and almost wish that they would never return for future work. Anesthetize them—give them the bliss of anesthetic relaxation, if not of unconsciousness—and they will prove to be model patients!

General anesthetics are valuable to the dental surgeon, and should be used for the following reasons:

First: To prevent pain, thus eliminating fatigue, collapse, and shock.

Second: Short sittings are made possible, which is beneficial to both patient and dentist.

Third: The operator is enabled to make a more thorough operation.

Fourth: The operator is enabled to accomplish an increased amount of work in a day.

Fifth: General anesthesia dignifies dentistry, elevates it to the plane of surgery, and augments the receipts of practice.

PROCEEDINGS OF SOCIETIES.

PENNSYLVANIA STATE DENTAL SOCIETY.

Forty-fourth Annual Meeting, Pittsburgh, Pa., June 11 to 13, 1912.

THE forty-fourth annual meeting of the Pennsylvania State Dental Society was called to order on Tuesday morning, June 11th, 10.30 o'clock, in the assembly room of the Carnegie Musical Hall, Pittsburgh, by the president, Dr. W. H. Fundenberg, Pittsburgh.

Rev. Dr. SAMUEL LINHART, secretary of the University of Pittsburgh, invoked divine blessings on the deliberations of the society.

Hon. B. M. IRONS, city solicitor, extended a welcome to the society on behalf of the city of Pittsburgh.

Dr. C. V. KRATZER, Reading, vice-president, responded to the address of welcome on behalf of the society.

Dr. Kratzer was then called to the chair while the president, Dr. W. H. FUNDENBERG, Pittsburgh, read his annual address, as follows:

PRESIDENT'S ADDRESS.

Mr. Chairman and Members of the Pennsylvania State Dental Society,—It is a pleasant privilege to welcome here today, to the forty-fourth annual session, so many men from all sections of this commonwealth.

Forty-three years ago, this society held its second annual meeting in this city; thirty-seven years then passed before we were again honored with its presence. Now, for the fourth time in its history, it again convenes here. We may congratulate ourselves upon having this beautiful institute for a place of meeting, surrounded as we are by libraries, museums, conservatories, and great schools, with many thousands of students—all of which should inspire us to higher ideals.

The committees have left nothing undone in expenditure of time, money, and energy to make this meeting one of profit as well as pleasure to each of you; and I am sure that I speak for not only myself, but for each member when I express to the committees our appreciation of their labor on our behalf.

I will endeavor in as brief a manner as possible to present for your consideration some matters to which I have given careful study and reflection, and which should receive your serious consideration.

MEMBERSHIP.

This organization has grown from a membership of 32 to 800. There are probably 3000 dentists in this state, many of whom should and probably will become members of this society. The problem then is, How are we to gather many of these in, and how are we to retain this greatly increased membership? There is but one way, and that is, to make this society so useful to the profession that its members cannot afford to remain out. The burden rests with us.

The tendency of the day is seen everywhere in organization and centralization; the gathering together under one head of many bodies widely scattered makes it possible to exert a tremendous energy that could not otherwise be accomplished, and the dental profession is awakening to this fact, and is now availing itself of the opportunity offered.

Today there are sixteen component societies represented here, and still we have much to do. Some of our societies overlap; there seem to be districts that have the material for organizing, yet are unorganized; there are large areas which are sparsely occupied by the profession that remain without organization. Some means might be devised for securing many members in these places.

Some 200 members come into this society directly—without using the local society—although many are members of their district society. In order to adjust this I suggest that the dues for such members be made three dollars.

COMMITTEE ON REORGANIZATION.

I urge upon the Committee on Reorganization the importance of determining so far as possible to what extent the component societies overlap and are distributed over the unorganized territory, and that they report plans for complete districting of the state, and prepare a chart showing the same for printing in the Transactions. In a short time, with proper care, we should have a membership of from twelve to fifteen hundred. Many of these members will be paying increased dues in their own local society under the new organization; many of them have never attended a state meeting, and many will not be able to do so, except on special occasions; we must, therefore, do something for these members, else this organization, now so promising, will fall apart of its own weight of members.

SELECTION OF PLACE OF MEETING.

I think it would be wisdom on our part in regard to the place of meeting that the convenience of members in all sections be considered. I therefore suggest that the sessions should alternate between Philadelphia for the east, Pittsburgh for the west, and Scranton, Wilkes-Barre, Harrisburg, Williamsport, and Altoona for the middle section.

PROPOSED CHANGE IN COMPOSITION OF COUNCIL.

In order to bring the component societies and their members into closer relationship to this body, and to secure if possible a greater interest on the part of their members, I would recommend that the by-laws be so changed that the Council, or house of delegates, be composed of members elected by the component societies, each society to be entitled to one member for each fifty or one hundred members or fraction thereof, the president, secretary, corresponding secretary, and treasurer of this society to be included as members.

PROPOSED DENTAL DEFENSE FUND.

Each year some of the profession are annoyed by suits or threatened suits for alleged malpractice. We can help those practitioners who are members of our society, and make them feel that it is an advantage to belong to this society if we are able to look after their interest in this matter. I would therefore recommend that a certain sum—perhaps ten per cent. of the dues received—be set aside by the treasurer as a special fund, to be known as the "Dental Defense Fund," this fund to be kept separate from other moneys of the society, and to be invested by the treasurer under the direction of the Council; this money to be used only for legal expenses of members of this society who are threatened with prosecution for alleged malpractice.

PROPOSED DENTAL RELIEF FUND.

At various times some of us have been called upon to aid an unfortunate member of our profession who has become destitute, old age or sickness coming upon him, and for whom temporary help would have been a great benefit; it therefore appears desirable that we set apart a certain sum each year—perhaps 10 per cent. of the dues received by the treasurer—as a special fund, to be known as "The Dental Relief Fund," which shall be kept separate from other moneys of the society, said money to be invested under the direction of the Council, to be used only for the relief of pecuniary distress of sick or aged members of this society.

COMMITTEE ON NECROLOGY.

The Committee on Necrology and others have always had more or less difficulty in obtaining a correct record of the deaths of our members, and with the increased membership this difficulty will be correspondingly greater. This could be obviated by placing in the proceedings a request that each component society promptly notify the Necrology Committee of the demise of any member and furnish, when possible, a short obituary.

DIRECTORY OF SOCIETY OFFICERS AND MEMBERS.

I would advise that a list of all the component societies and the address of the secretary of each be incorporated in the published proceedings. It would also be a source of information if the number of state society members accredited to each local society were published, which might promote a helpful rivalry among the societies.

REGULATION OF DENTAL INSPECTION IN PUBLIC SCHOOLS.

The awakening of the profession and the laity at large to the importance of prophylaxis and conservation of the dental organs of the children in public institutions, which is evidently becoming of nation-wide interest, suggests that we endeavor, as a society and as individuals, to secure the appointment of qualified inspectors in this work.

In many localities physicians alone do the examining, and with all respect to them as medical men, they are undoubtedly as a rule not qualified to do the dental inspection. The condition as it now exists results in friction between the examiner and the family dentist. There should be both medical and dental examiners in these institutions. If both cannot be secured, then the examining physician should be a dental graduate.

MEMBERSHIP IN THE N. D. A.

I desire to call your attention to the movement under way for bringing all state dental societies into the National society as component societies. It is greatly to be desired that the National society be made larger and more effective, and worthy to represent American dentistry. The National Association has tentatively adopted a new constitution, prior to which seven states had acted in this matter. Since the adoption of this constitution, fourteen state societies have voted to become component societies.

I wish you to consider this matter, and ask you to hear the delegate of this society whom I appointed last year after the society had adjourned.

These few suggestions are presented to you with the hope that, through their consideration, we may arrive at the best means for making this society a greater organization, serving a larger number and more effectively advancing the profession.

I am sure I will have your co-operation in the endeavor to make this meeting orderly and business-like. If, upon rising, each speaker will address the chair, giving his name, it will assist the presiding officer and the official stenographer.

In closing, permit me to express my appreciation of the honor you have conferred upon me by selecting me to preside over this body.

Dr. H. E. FRIESELL moved that a committee be appointed to consider the recommendations contained in the President's address, and to report later.

The motion was carried, and the President appointed the following committee: Drs. H. E. Friesell, I. N. Broomell, and A. P. Lee.

The next order of business was the reports of officers and committees.

Dr. L. M. WEAVER, recording secretary, presented his report, which was on motion received.

Dr. W. A. SPENCER, treasurer, presented his report, which was accepted, subject to the approval of the Auditing Committee, to be appointed.

REPORT OF PUBLICATION COMMITTEE.

The Publication Committee, through Dr. WEAVER, chairman, reported as follows:

> As chairman of the Publication Committee I have practically taken charge of its affairs, and attended to its duties without consulting the other members of the committee. The DENTAL COSMOS reported and published our proceedings, and sent to each member a copy of the printed Transactions, amounting to 825 copies. Under our original agreement with the COSMOS we had a membership of 275, and this has gradually increased during the past six years to 825. The DENTAL COSMOS has, without any new agreement, gladly published our Transactions and furnished the additional number without any expense to the society, and I think that some action on this would be appropriate on our part.

Dr. MCCULLOUGH. I move that the report of the Publication Committee be accepted, and that a vote of thanks be extended to the publishers of the DENTAL COSMOS for their considerate treatment of the society. (Motion carried.)

The next order of business was the report of the Committee on Science and Literature, by Dr. E. S. FILBERT, Pottsville, as follows:

REPORT OF THE COMMITTEE ON DENTAL SCIENCE AND LITERATURE.

Your committee, when intrusted with this task last fall, thought it would be of a rather easy nature, but since undertaking the work, has come to realize that it is a difficult matter not only to make a complete report, but to collect data that will be interesting to the majority. Therefore, believing that the former committee which had this matter in charge was working in the right direction, your committee for 1912 will follow in the former committee's footsteps.

In looking over the literature as presented by the leading magazines, we are confronted by a majority of articles on pyorrhea alveolaris, prophylaxis, and gold inlays.

CAST GOLD INLAYS.

One of the most notable series of articles, consisting of four, is that of Dr. C. S. Van Horn on the "Standardization of the Gold Inlay." Dr. Van Horn has spent many years in the study of this most interesting phase of the practice of dentistry, and has at last contrived a method that is as near perfection as it is possible, at this time, to obtain. His series of articles has been published in the DENTAL COSMOS. To those interested in gold casting, these articles are well worth reading and following.

Dr. Hart J. Goslee in the DENTAL COSMOS of May 1912 published a very interesting paper on "The Extent to Which the Casting Process May be Advantageously Applied in Crown and Bridge Work."

Other important articles on gold inlays are: "The Gold Inlay," by Dr. J. V. Conzett; "The Scientific Casting of Gold," by Dr. W. H. Taggart; "Ancient Origin of Dental Casting," by L. W. Strycken.

PROPHYLAXIS.

All of the magazines have published, at different times very interesting articles on that extremely important subject, prophylaxis, but special mention should be made of the work which is being done in this field by the *Oral Hygiene* magazine. Anyone who has a leaning toward that subject will find the articles contained therein to be well worth reading.

PYORRHEA ALVEOLARIS.

That never-to-be-forgotten subject, pyorrhea alveolaris, has produced many articles of interest, among which the following are noteworthy:

"Massage and Bismuth Paste in Pyorrhea Alveolaris," by Prof. Piergili, Rome.

"Pyorrhea Alveolaris—Its Interpretation," by A. Hopewell-Smith.

"Autogenous Vaccine in the Treatment of Pyorrhea Alveolaris," by G. D. Laymon and J. K. Kingsbury.

"The Constitutional Significance of Pyorrhea Alveolaris," by Geo. Edwin Hunt.

"Some Phases of Pyorrhea Alveolaris and Its Treatment by Bacterial Vaccines," by Geo. B. Harris.

"Pyorrhea; Its Cause, Effects, Treatment, and Prevention," an illustrated article by W. F. Spies.

MISCELLANEOUS ARTICLES OF INTEREST.

Other articles of interest and importance are the following: "Bismuth Paste in Chronic Suppurations of the Jaw, Its Diagnostic Importance and Therapeutic Value," by Rudolph Beck; "Some Recent Investigations upon the Histology of the Dentin," by C. F. Bödecker; "The Study of the Micro-organisms of the Human Mouth," by Theo. von Beust; "The Relation of the Temporary Teeth to the Permanent Teeth," by E. A. Bogue; a series of articles on "Dental Radiography," by Howard R. Raper; "Modern Methods of Producing Local Anesthesia," by Hermann Prinz; "Is the Dental Profession Prepared to Abandon the 'D.D.S.'?" by James Truman; "A New Process of Filling Teeth with Cast Porcelain Inlays," by F. S. Welden; "The Surgical Treatment of Cleft Palate," by J. H. Jacobson; "Repair of Cementum (Anent the Treatment of Alveolitis)," by M. H. Fletcher; "The Anatomy and Physiology of the Gums and Sockets," by W. H. Whitslar; "The Diagnosis of Diseases of the Tooth Pulp," by Hermann Prinz; "The Problem of the Construction of Good Dentures," by T. W. Pritchett; "The Problem of the Construction of Good Dentures," by J. H. Prothero; "Some Conclusions Growing Out of a Study of the Cause of Dental Caries," by C. E. Jones; "Report of Thirty-six Cases of Empyema of the Antrum," by A. B. Baer; "Nature of the Enamel of the Human Teeth," by C. Francis Bödecker; "The Gingival Manifestations of Certain Metabolic Disorders," by Alfred C. Croftan; "An Experimental Study of the Tooth-Staining Properties of Various Colored Dentrifices," by W. H. O. McGehee.

Your committee would call attention to the following articles as abstracted in the DENTAL COSMOS:

SUPERNUMERARY TOOTH IN THE NOSE.

"A Case of Supernumerary Tooth in the Nose," by Dr. Boval, Charleroi.

This case, a girl of nine-and-a-half years, presented with concomitant symptoms of abundant secretion and impeded respiration owing to the nasal obstruction. The general health was good. The tooth was extracted without any difficulty by the aid of curved forceps, after previous incision into the mucosa covering the root.

MASSAGE AND BISMUTH PASTE IN PYORRHEA ALVEOLARIS.

"Massage and Bismuth Paste in Pyorrhea Alveolaris," by Professor Piergili, Rome.

The following technique is applied by Prof. Piergili, which he follows by systemic treatment: The author first washes the pus pockets with an antiseptic solution, and then evacuates all pus by gingival massage, for which purpose Fleischmann's vibratory massaging instruments may be employed. The pockets are then again flushed with an antiseptic solution, and the tartar deposits on the root and in the depth of the pockets are carefully scraped away, using as a solvent ammonium bifluorid, introduced on a platinum wire. A mixture of one part of bismuth subnitrate and two parts of vaselin is then injected into the pockets by means of a Pravaz syringe. After from two to three days the massage is repeated in order to ascertain whether any pus remains, any particles of tartar that may have been left are removed, and the injection of the bismuth paste is repeated. After a few sittings the pockets will be found to be sterile. The gingival massage is then again applied in order to stimulate circulation, and—the author assures us—the cure is complete.

USE OF SILVER IN PROSTHETIC DENTISTRY.

"The Use of Silver in Prosthetic Dentistry," by L. Cecconi, Paris.

Owing to its malleability and its tenacity, silver can be employed for crowns, inlays, bridges, and backings. Its tenacity is superior to that of gold, a silver thread of two millimeters breaking under a pull of eighty-five kilograms, while a gold thread of the same dimension breaks under the pull of sixty-eight kilograms. For instruction in prosthetic technics, it has the advantage of its considerably lower price than gold, and, being more difficult to manipulate, it yields better teaching results. In its behavior under the stress of mastication, silver is similar to gold. Silver can be sweated at a degree slightly lower than its fusing-point, *i.e.* 1000° C. The surfaces to be united by autogenous soldering must be very clean in order to avoid as much as possible the formation of a silver sulfid, which oxidizes the surfaces and renders union impossible. Since silver solder oxidizes at the same temperature as silver, its employment is unnecessary, as it only complicates the soldering process and leaves traces of solder. Silver crowns are made in the same way as gold crowns. They can be either sweated or soldered. The masticating surface of crowns can also be cast in silver, but it will not unite with the silver band owing to a layer of silver sulfid, which forms under the influence of the heat. The adaptation, however, is perfect, and union can be effected with minute pieces of solder. If the silver crown is cast on a 22-karat gold band, union will take place. The procedure of casting silver backings and inlays is the same as with gold. Silver bridges can be either cast or soldered, and are very satisfactory.

SILICATE CEMENT FILLINGS.

In the article of Dr. Adelheid A. Jacobi of Goerlitz, on "Practical Hints for Silicate Cement Fillings," we note the following:

In inserting silicate cement fillings, the most minute factor must be carefully observed. Before adjusting the rubber dam, the occlusion should be noted to see where and how the antagonistic teeth occlude with the teeth to be filled, whether the cusps or surfaces of the antagonists would disturb the prospective filling, or how high the filling should be built up. In case of very close bite, the patient is asked to close, after the cement has been introduced into the cavity, and before the filling is finished and polished. The impression left by the antagonist through the rubber dam shows how the contour should be built up, thus avoiding untoward grinding afterward. After removing the rubber dam, the filling is protected by varnish, and then articulating paper is laid between the filling and the antagonist. This does not spoil the filling, as the blue color adheres to the varnish only. If the articulation requires some slight improvement, it is better to grind a prominent cusp or surface of the antagonist. The filling should never be exposed to great stress from the antagonist, thus avoiding any chipping of the cement or forcing of the filling from a shallow cavity. In very crowded teeth, when even the finest instrument or a celluloid strip cannot be passed without damaging the shape of an approximal filling, a narrow rubber-dam strip coated with vaselin will be found convenient for adapting the filling closely to the cavity margins and for smoothing the approximal surface. It is important to instruct the patients that teeth filled with silicate cement must be kept scrupulously clean. Brushing upon arising and upon retiring is not sufficient, but the interproximal spaces must be freed of food débris after every meal, with waxed silk floss. In this way the filling is kept smooth and clean, and cannot be so rapidly destroyed by nascent acids.

HEATED ETHER IN GENERAL ANESTHESIA IN DENTISTRY.

As the profession becomes more interested each year concerning anesthesia, the following notes on "Considerations on Heated Ether in General Anesthesia in Dentistry," by Dr. A. J. Danon, will be found valuable:

The heating of ether for general anesthesia is not a complicated procedure, as it is sufficient to place the ether receptacle for several seconds in a vessel containing boiling water. Ether boils at 35° C. The loss of ether from this procedure is very insignificant, if the receptacle is removed from the water as soon as the ether boils. Ether retains in the receptacle a temperature above 25° C. for ten minutes. In prolonged anesthesia it is only necessary to immerse the receptacle again in hot water to bring it to boiling-point. Measurements made during ether narcosis show the necessity for the use of a large mask. Narcosis with heated ether is established no more quickly than that obtained with the non-heated drug; about the same amount of ether is necessary in both methods. The heating of ether vapor diminishes the likelihood of its deleterious action on the bronchial epithelium. The temperature of the mixture of ether and air inhaled by the patient is higher than room temperature, and at the end of the narcosis varies from 23° to 25° C. During the narcosis itself, the average temperature of the ether rises to 29°. The use of heated ether vapors insures more favorable conditions for the respiratory system than ether vapors administered at ordinary temperature.

RE-COVERING EXPOSED NECKS OF TEETH BY AUTOPLASTY.

An ingenious method as practiced by Dr. P. Rosenthal is well worth considering. It is known as "Re-covering the Exposed Necks of Teeth by Autoplasty."

The exposure of the necks of teeth, when not the result of a diathesis or general pathologic condition, may be remedied by autoplasty, which yields immediate and fairly permanent results. In an otherwise normal denture, one or two teeth may present exposed necks owing to a local accumulation of tartar, traumatism, erosion, or caries. Such cases of recession of the gum can be remedied only by a surgical operation, and provided the patient is not too far advanced in age and enjoys normal health and vitality. First of all the affected tooth is subjected to a thorough mechanical cleansing, and its surface contour, if necessary, is restored by a gold filling. The gum above the tooth to be operated on is carefully sterilized with tincture of iodin, and a horizontal incision is made of the width of the tooth, at right angles with the long axis and sufficiently high up on the gum to furnish a good-sized flap. This incision should involve the periosteum. The flap is then stripped off the bone by inserting a fine instrument under it, starting at the neck of the tooth. It should be large enough to allow of easy mobility. A silk ligature is then passed under the central portion of the flap parallel with the incision, and taking in almost the entire breadth of the flap. Another ligature is tied tightly around the free portion of the tooth, and to this ligature the first ligature is secured, the flap being drawn up a little higher than the normal gum line of the tooth to allow for any recession from cicatrization. The wound and the ligatures are painted with tincture of iodin, this antiseptic treatment to be repeated daily. From the second day the gum is massaged in the direction of the long axis and toward the free portion of the tooth. On the fifth or sixth day the ligatures are removed; as a rule, cicatrization is then sufficiently advanced to prevent recession of the flap. The primary incised wound fills up completely, without leaving a scar. The author claims that in the cases kept under observation for several years, the results are still perfect. It seems, however, doubtful, to say the least, that the process of healing is as rapid as he would have us believe, owing to the continual presence of bacteria in the mouth, which can surely not be combated by one daily application of tincture of iodin.

KEEPING THE TOOTH-BRUSH ASEPTIC.

Concerning sterilization of the tooth-brush, the *Journal of the American Medical Association* says:

Another time-honored and long-cherished institution has been attacked by the ruthless scientist and hygienist. This time it is the tooth-brush. Soap and the tooth-brush have hitherto been considered almost indispensable adjuncts of civilization. After years and years of patient teaching of the young that correct personal hygiene required the use of the tooth-brush, after its adoption as a necessary or desirable part of the accoutrement of the United States soldier, who proudly carried it, stuck in the band of his hat, in the campaigns in Cuba, Porto Rico, the Philippines, and in the Boxer rebellion in China, where it was observed and commented on favorably by the observers of the sanitary departments of the armies of the world, it is now to be discredited because it is not conformable to modern hygiene and sanitation. The tooth-brush, according to Smale and Jones, becomes septic after being used once, each bristle becoming an inoculating needle by which the person using it may become inoculated with the multitudinous germs which flourish on it, producing pyorrhea alveolaris, with such serious possible sequelæ as anemia, gastritis, and arthritis. They propose as a solution of the difficulty that a new brush be used each time, or that the brush be boiled for five minutes after each using, or that it be kept in a one per cent. solution of tricresol or a ten per cent. solution of formaldehyd. It is a bit disconcerting to think that we have been going along all these years teaching the correctness of the use of the tooth-brush, only to find that instead of being an aid to good personal hygiene, it has been an instrument for creating or perpetuating infections. An effective method, and better because practical and simple, would be to wash the brush thoroughly after using, rinse it in an antiseptic solution—boric acid, for instance—and then dip it in a bottle corked with antiseptic cotton. The hygienic condition of the toothbrush is certainly a matter worthy of attention.

NEW BOOKS.

"Vergleichende Anatomie des Menschlichen Gebisses und der Zaehne der Vertebraten" (Comparative Anatomy of the Human Teeth and Those of the Vertebrates). By Dr. Paul de Terra, formerly Zahnarzt in Zurich. Pp. 451, with 200 text illustrations.

"The Administration of Nitrous Oxid and Oxygen for Dental Operations." By Frederic W. Hewitt, M.V.O., M.A.,M.D.Cantab., Anesthetist to His Majesty the King, etc. Fourth edition. Illustrated. Pp. 116.

"A Laboratory Manual of Physiological Chemistry." By Elbert W. Rockwood, M.D., Ph.D., professor of chemistry and toxicology and head of the Department of Chemistry in the University of Iowa, etc. Second edition, revised and enlarged. One colored plate and three plates of microscopic preparations. Pp. 229.

"A Text-book of Chemistry for Students and Practitioners of Medicine, Pharmacy, and Dentistry." By Edward Curtis Hill, M.S., M.D., of the University of Colorado. Second edition, thoroughly revised, rewritten, and considerably enlarged. With 100 illustrations in the text and 14 full-page half-tone and colored plates. Pp. 659.

"Dental Surgery and Pathology." By J. F. Colyer, L.R.C.P., M.R.C.S., L.D.S., of London. Third edition of "Diseases and Injuries of the Teeth," by Morton Smale and J. F. Colyer. London and New York.

"Anatomy, Descriptive and Applied." By Henry Gray, F.R.S., late Fellow of the Royal College of Surgeons, etc. Eighteenth edition, thoroughly revised and re-edited, with additions, by Edward Anthony Spitzka, M.D., of Philadelphia. Pp. 1496, illustrated with 1208 engravings.

"A Manual on Dental Metallurgy." By Ernest A. Smith, Associate of the Royal School of Mines, etc., London. Third edition.

"Dental Materia Medica, Pharmacology, and Therapeutics." By Chas. W. Glassington, M.R.C.S., L.D.S. Second edition. Pp. 287.

"Anatomy—A Manual for Students and Practitioners." By John F. Little of Philadelphia. Second edition, enlarged and thoroughly revised. Pp. 491, with 75 engravings.

"Von der Unterkieferresektionsprothese." By Dr. J. Billing, Stockholm, Sweden. (A volume in the German language dealing with the pathological anatomy of the mouth and jaws and their restoration by prosthetic means after operation.) With 112 original illustrations.

"Svenska Tandläkare Sallskapets Historia." By Matte Schmidt and Harald Ramberg. A history of the Swedish Dental Society for the past fifty years. Pp. 284.

"Essentials of Operative Dentistry." By W. Clyde Davis, B.S., M.D., D.D.S., of the University of Nebraska. Pp. 266.

"A Practical Medical Dictionary." By Thos. Lathrop Stedman, A.M., M.D. Illustrated; 1000 pages.

"Dental Disease in Its Relation to General Medicine." By J. F. Colyer, L.R.C.P., M.R.C.S., L.D.S., with the assistance of Stanley Colyer, M.D., M.R.C.P., D.P.H. With illustrations.

"Dental Materia Medica and Therapeutics." By Hermann Prinz. Second edition, revised.

"The American Text-book of Operative Dentistry." Edited by Edward C. Kirk of Philadelphia. Pp. 932, with 1015 Illustrations.

"The Practical Orthodontist." By A. G. Meier.

"The Prevention of Dental Caries." By J. Sim Wallace, D.Sc., M.B., L.D.S., of London. Pp. 42.

"A Manual of Dental Prosthetics." By

George H. Wilson, D.D.S., of Cleveland. Pp. 507, with 396 illustrations.

"History of Dentistry in Cleveland, Ohio." By Henry Lovejoy Ambler, M.S., D.D.S.

"Theory and Practice of Thyroid Therapy." By Herbert Ewan Waller, M.R.C.S., L.R.C.P. Pp. 154.

"Recitation Handbook of Anesthetics." By Mervyn Ross Taylor of Philadelphia. Pp. 96.

"Notes on Dental Anatomy." (A Pocket "Tomes.") By T. W. Widdowson, L.D.S., of London. Pp. 122.

"Physiology—A Manual for Students and Practitioners." By A. E. Guenther, Ph.D., and Theodore C. Guenther, M.D. Second edition, thoroughly revised. Pp. 269, illustrated.

"Microscopy, Bacteriology, and Human Parasitology." By P. E. Archinard, A.M., M.D., of New Orleans. Pp. 267, with 100 engravings and 6 plates. Second edition, thoroughly revised.

"Principles and Methods of Orthodontics." By B. E. Lischer, D.M.D., of the Washington Dental School. Pp. 258, with 248 illustrations.

"Local Anesthesia in Dentistry. With Special Reference to the Mucous and Conductive Methods." By Prof. Dr. Guido Fischer, Univ. Marburg. Transl. from 2d German edit., by R. H. Riethmueller, Ph.D. (Univ. Pa.), Dental Dep't Med.-Chir. Coll., Philadelphia. Pp. 202, with 105 figures.

"Developmental Pathology—A Study in Degenerative Evolution." By Eugene S. Talbot, M.S., D.D.S., M.D., LL.D., of Chicago. Pp. 434, with 346 illustrations.

"Applied Anatomy and Oral Surgery for Dental Students." By Robert H. Ivy, M.D., D.D.S., of Philadelphia. Pp. 280, illustrated.

"Practical Dental Metallurgy." By Joseph Dupuy Hodgen, D.D.S., of the University of California. Pp. 373.

"Educational Lectures on Dental and Oral Hygiene." By Dr. T. C. Trigger of Ontario, Canada. Pp. 64.

"A Text-book of Dental Histology and Embryology, Including Laboratory Directions." By Frederick B. Noyes, B.A., D.D.S., of Chicago. Pp. 510, with 350 ilustrations and 19 plates.

"The Surgery of Oral Diseases and Malformations, Their Diagnosis and Treatment." By Geo. V. I. Brown, D.D.S., M.D. Pp. 740, with 359 engravings and 21 plates.

"The Prevention of Dental Caries and Oral Sepsis." By H. B. Pickerill, M.D., Ch.B., M.D.S., L.D.S.

"Leucoplasia Buccale." (Leucoplakia in the Mouth.) By Dr. Aldo Maggioni Winderling. Pp. 230, with 6 partly colored plates.

"Handbook of Anatomy." By James K. Young, M.D. Third edition, revised and enlarged. Pp. 402, with 172 engravings, some in colors.

"Old Age Deferred. The Causes of Old Age, and Its Postponement by Hygienic and Therapeutic Measures." By Arnold Lorand, M.D. Third edition, translated with additions by the author from the third German edition. Pp. 480.

"Histoire Générale de la Chirurgie Dentaire, depuis les Temps Primitifs jusqu'à l'Epoque Moderne et Principalement en France." (General History of Dental Surgery from Primitive Times to the Modern Epoch, and Especially in France.) By J. L. Andre-Bonnet. Pp. 318.

"Chemisch-Technische Rezepte und Notizen fuer die Zahnpraxis." (Chemical and Technical Formulæ and Hints for Dental Practice.) A collection of 1300 practical prescriptions, methods, and hints. By Alfred Sedlacek. Third edition, completely revised and enlarged.

"Dental Anesthetics." By John Bolam, D.D.S.

"American Pocket Medical Dictionary." Edited by W. A. Newman, A.M., M.D. Seventh edition, revised and enlarged. Pp. 643.

"Causes of Decay in Human Teeth. Obstinate Pyorrhea. Oral Hygiene, and Prosphate Cement Solubility. Original Classified Researches." By J. Oxford Keller, D.D.S. Pp. 93.

"Modern Dental Materia Medica, Pharmacology, and Therapeutics, Including the Practical Application of Drugs and Remedies in the Treatment of Disease." By J. P. Buckley, Ph.G., D.D.S. Third edition, revised. Pp. 395, with 72 illustrations.

"Lectures on General Anesthetics in Dentistry." By Wm. Harper DeFord, A.M., D.D.S., M.D. Second edition with illustrations. Entirely revised and rewritten. Pp. 300.

NEW JOURNALS.

New journals and renewed publications are as follows:

The Dental Forum (University of Buffalo), which was temporarily discontinued with the June issue, 1909, again appeared in February of the present year, as volume xiii, No. 1.

The Progressive Dentist made its initial appearance in January 1912. It is a small monthly journal, published by the Dentists'

Study Chapter, Intercollegiate Socialist Society, New York city.

The New Jersey Dental Journal was first issued in January 1912. It is a small octavo, issued monthly in the interests of the so-called "insurgents" of New Jersey State Society. The editor is Dr. C. S. Hardy of Summit.

Respectfully submitted,
E. S. FILBERT, *Committee.*

Dr. KRATZER moved that the report be received, with the thanks of the society to the committee. (Motion carried.)

REPORT OF COMMITTEE ON NECROLOGY.

The next order of business was the report of the Committee on Necrology, by Dr. W. H. TRUEMAN, Philadelphia, as follows:

Your Committee on Necrology regret to report two deaths since we last met.

George G. Milliken.

Dr. Geo. G. Milliken passed to the higher life on December 22, 1911, in his fifty-eighth year.

Dr. Milliken was born in Philadelphia in 1854. He received his education in the Friends' high school, Philadelphia, and on leaving that institution for a time engaged in mercantile pursuits. In the fall of 1883 he began his professional career by entering as a student the dental department of the University of Pennsylvania, and was graduated in the spring of 1885. In the autumn of that year he was appointed demonstrator in the operative clinic, serving in that capacity until 1888, when he resigned to enter the medical department of the institution. In 1891 he received the degree of M.D.

The following year he was appointed demonstrator in the operative clinic of the dental department. He developed marked ability as an instructor in operative technics, and in 1897 was appointed assistant professor of operative technics, a position he held at the time of his death. In addition to his work as a teacher he carried on a successful practice of dentistry.

F. Lee Hollister.

Dr. F. Lee Hollister of Wilkes-Barre passed away on January 24, 1912. Dr. Hollister was a member of the State Society for many years, and also active in the Susquehanna Dental Society, and the Luzerne and Lackawanna Dental Society. He had a large practice and ranked among the foremost dentists of Wyoming Valley. His genial disposition, his professional spirit, and his keen interest in the welfare of his compeers gathered around him a host of friends.

While mourning our loss, we find consolation in contemplating their well-spent lives and their encouraging professional careers.

WILLIAM H. TRUEMAN.

Motion was made that the report be received.

Dr. BROOMELL. I move, as an amendment to that motion, that the society stand in silence for one minute in memory of these men.

The motion with the above amendment was carried, and the audience stood for one minute in memory of the members mentioned in the report.

The Committee on Oral Hygiene asked to be allowed to report at a later session, which was granted.

Motion was then made and carried that the society adjourn until the afternoon session at 2.30.

TUESDAY—*Afternoon Session.*

The meeting was called to order on Tuesday afternoon at 2.30 o'clock, by the president, Dr. W. H. Fundenberg.

The President appointed as temporary members of the Board of Censors Drs. A. S. Koser and J. J. Moffitt.

The next order of business was the report of the Council by Dr. Weaver, secretary.

The next order of business was the report of the Committee on Enforcement of the Dental Law.

Mr. HARDING, attorney for the Committee on Enforcement of the Dental Law, supplemented the report of the committee by explaining the manner in which the work was done from a legal standpoint.

Motion was made and carried that the report be received and adopted as read.

The next order of business was the reading of a paper by Dr. W. H. DeFord, Des Moines, Iowa, entitled "General Anesthetics—Can the Dental Surgeon Use Them to Advantage in Daily Practice?"

[This paper is printed in full at page 1126 of the present issue of the Cosmos.]

Discussion.

Dr. H. S. Haslett, Pittsburgh. I have read Dr. DeFord's essay from beginning to end, and have gathered a very great deal of useful knowledge from it.

In the introduction of his paper the essayist places before us an ideal that would be well worth while striving for. He tells us that dentists have done more for suffering humanity than has the profession of medicine. He indicates how we can restore teeth to usefulness, but he fails to say that they may eventually be lost. In justice to the medical profession we must admit that, as the surgeon will heal his patient of one disease to have him die of another, so we cannot preserve teeth indefinitely.

The essayist emphasizes that we have positively no right to inflict pain on the patient. About sixty-eight years ago anesthesia was given to us by a dentist. Our attention was called to anesthesia by Dr. Wells, but we paid little or no heed to it at that time. Two years later, another dentist came forward with the same method, though he used a different agent, and again dentists paid no attention to it whatever. The medical profession, however, saw the value of anesthesia, took it up, and made excellent use of it, making surgery possible. Why is it that anesthesia has not made dental surgery possible? Is it because we are afraid? Is it because we fear to administer an anesthetic? This is a question that I am not able to answer satisfactorily to myself. The truth remains, however, that almost sixty-eight years ago we were given anesthesia, and today not ten per cent. of dentists are applying it as it should be applied. With the means we have at hand today, with the remedies and the agents referred to by the essayist—nitrous oxid, somnoform, ether, and chloroform—there is no reason why we should not be administering some of these every time we operate.

A few years ago a building was razed to the ground in the suburbs of London on a site which had been occupied by a hospital previous to the discovery of anesthesia. After anesthesia had been given to the world, a false floor had been placed over the original floor, and when the building was razed and the false floor lifted from the original floor, there were found rings and straps that had been used to hold patients on the table while operations were being performed. We look upon these contrivances as a horrible spectacle today. Can you imagine a surgeon today asking a patient to lie on the table, while he is being strapped down for the purpose of having an arm or a leg amputated without being given any anesthetic? Yet we are not so far from doing that every time we operate without administering some anesthetic to our patients. We can produce shock just as surely, though possibly to a lesser extent, by operating in a patient's mouth, as the surgeon can in amputating an arm. The essayist considers it our duty to use anesthesia to the best advantage. It is ours by right of double discovery. Surgeons today are using anesthesia to advance their specialty, and yet we are sitting by idly, and allow the surgeon to carry it to perfection, while we should have taken it up and allowed the surgeon to follow in our wake, instead of our just awakening to the fact that anesthesia is a blessing to the patient as well as to the dental surgeon.

Dr. Geo. T. Gregg, Pittsburgh. I would briefly express to you and to Dr. DeFord my appreciation of the benefit he has bestowed on me by interesting me in the use of nitrous oxid and oxygen. His writings have stimulated me in the use of this anesthetic. I read the first series of papers that he wrote, which helped to remove a great load from my shoulders.

When the essayist first began to plead for the relief of pain in dentistry, very few practitioners were using an anesthetic, especially nitrous oxid and oxygen, but their number and their enthusiasm have been greatly increased since then. The practitioners who are not taking advantage of the opportunities of anesthesia are missing a great deal. The dental profession is hunting for every possible means imaginable to save teeth and fill them properly, but if a practitioner will learn any method of relieving pain, he will do better work and certainly save more teeth than he could in any other way. I might mention a great many cases similar to those cited by Dr. DeFord. I just finished this morning one case which shows how patients are not given the proper dental care, not because the dentist does not possess the necessary ability, but because he does not have the courage to force his patients to undertake the ordeal which they would have to undergo in order to have their teeth filled properly. This patient had been referred to me by a very prominent physician in our city, who is paying a good deal of attention to the mouth, and while she was under his treatment he had examined her mouth and told her that her teeth were in very bad condition. She was astonished, and although she was sick in bed, she rose and went to her dentist in Philadelphia with the intention of finding out what the trouble was. I do not know what treatment she received there; at any rate she was afterward sent to me, and I filled in her mouth about twenty-five cavities of decay—and that in a mouth which was supposed to be in good condition. I administered nitrous oxid and oxygen, and did the work without inflicting any pain or suffering to the patient. She was such a delicate, sensitive girl that I do not think this work could have been done otherwise.

Many severe cases can be manipulated very easily with this anesthetic. If, for instance, an abscess is developing in an anterior tooth which is so sore that it cannot be touched, what is the operator to do without some method of relieving that pain? The ordinary method of procedure is to put a little iodin on the patient's gums and send him away to suffer for twenty-four hours longer. In such cases I administer nitrous oxid and oxygen sufficiently long to open up the tooth and relieve the patient, in doing which I usually succeed in a few minutes without any pain to the patient. If an operator does not use this method for any other operations, the apparatus would be worth having in his office just for a few such cases.

Dr. CHAS. E. PETERS, Pittsburgh. It is with some timidity that I take up the discussion of this paper on anesthetics, especially in the presence of such an eminent authority as Dr. DeFord.

To add anything to the masterly treatment of the subject by the essayist seems wellnigh impossible to one whose limited experience with anesthetics covers a period of not over three and a half or four years, and comprises possibly four hundred administrations, mostly for analgesic purposes. Hence what I shall have to say will be more in the nature of a testimonial.

Can the dentist use anesthetics to advantage in daily practice? My experience has proved to my satisfaction that there is without a doubt a place in dentistry for anesthetics aside from their use for extractions.

I have heard the remark that a great many of our most successful and expert operators practice without anesthetics, and that it is only within recent years that anesthesia has been adopted as an aid in operating. In answer to this I would say that those who have never used anesthetics do not realize how many nerve-racking, vitality-consuming, and exasperating ordeals they could have spared themselves and their patients, to say nothing of the saving in time, by the aid of one of these agents. Of course in many, possibly in the majority of patients, sharp instruments used by skilful hands are all that is necessary, but if an anesthetic will help the operator to cope successfully with one of those difficult cases once in a day, or even once in a week, then, in my opinion, it holds a valuable place in every dental practice.

The essayist has given us the most important rules governing the administration of an anesthetic.

He tells us that in the beginning of

an anesthetist's career, the operator who is not accustomed to administering anesthetics is apt to be more frightened than the patient. This brings to me memories of many of my early experiences, and I want to emphasize the essayist's statement that, in order to gain the confidence of the patient, the operator must have confidence in himself. This rule holds good and is necessary to success in all our work, but especially in the use of anesthetics. With the use of nitrous oxid and oxygen I now have success where formerly I had failure owing to my lack of experience and of confidence in myself.

The class of patients that the essayist has described as exhibiting symptoms of shock, such as extreme nervousness and breaking-out in cold, clammy perspiration, or shock proper, either physical or psychical, needs the aid of an anesthetic, and they generally take to it readily. They may be timid at first, but, when once started, they become enthusiastic and confident, and prove to be patients who are easy to operate upon.

I was greatly interested in the description of shock and its classification. We have all seen this phenomenon exhibited many times, and if we as a profession are responsible for so much nerve exhaustion or neurasthenia, and have the means at hand for eliminating a portion of it, it becomes our duty to use that means. The people of this generation will not endure what they did in past generations, and why should they? At the same time, by the more general use of anesthetics for analgesic purposes, we raise the standard of the dental profession in the estimation of the laity.

We cannot all have the benefit of a trained assistant such as the essayist mentioned, but, unless we administer nitrous oxid and oxygen for profound anesthesia, we do not need one. Any office assistant can easily learn to give all the assistance necessary in analgesic work. In fact, I generally manage without any aid, except in the case of a patient's first experience, when the assistant proves to be an excellent help in reassuring the patient and putting him at ease.

Dr. W. D. DeLong, Reading. I have been a student of Dr. DeFord for a number of years, but never had the pleasure of meeting him personally until this afternoon, and I want to take this opportunity to express my thanks to him for what he has done for me in reference to this subject, and I am sure that I express your sentiments when I say that he has done a great deal for the profession at large.

As far as his technique is concerned, I have nothing but indorsement for what he has said. There is one statement, however, which raised a question in my mind, as I read his paper, and that I would like to touch upon. In his introduction, the essayist, in speaking of medicine *versus* dentistry, said: "Compare results and see how much more scientifically we as dental practitioners have overcome the obstacles in our path, and how much more successful we have been in performing our mission than has the general practitioner of medicine or surgery. Let us thank God and take courage that we have made good!" The question came to my mind, whether that is not dangerous teaching. Have we made good? Have we successfully fulfilled our mission? If we feel that way, I am afraid there is danger of our becoming apathetic in our researches and experimentation. Certainly we have made rapid progress, but we should not be satisfied. Undoubtedly we may feel proud of our progress, but there are still large obstacles to be overcome. What do we know about caries or pyorrhea? While the essayist states that the medical profession has a large mortality, there is also a large mortality staring us in the face, not in human lives but in human teeth. Numbers are dying daily and are being buried. True, they are being replaced, but the number of teeth manufactured—which amounts to millions each year—shows us the extent of the death-rate, and unless we can diminish that death-rate of natural teeth, our mission is not fulfilled.

As far as the technique is concerned,

I am in accord with the essayist. I am an enthusiastic advocate of the use of nitrous oxid and oxygen. I use it daily in my practice, with most beneficial results, and cannot see how anyone can practice scientific dentistry at this time without employing this means of alleviating the sufferings of his patients.

Dr. R. M. Erwin, Pittsburgh. I have had experience with nitrous oxid, not as an analgesic but as a sleep-producer, so that I am unable to say much on its analgesic effect. I wish to say, however, that in my opinion nitrous oxid and oxygen should be more generally used than it is today. The after-effects on the patient are much more satisfactory than those of either chloroform or ether, as are also the results in regard to shock.

Speaking of psychic shock, the anesthetic is often blamed if the patient is not feeling well after the tooth has been extracted. This is not justified in many cases—because, in the first place, we do not have the same opportunity to prepare the patient for the anesthetic as does the surgeon. The patient is already on the verge of shock when he comes to have a tooth extracted. I would like to ask Dr. DeFord if in many cases where shock is experienced after the use of the anesthetic, this is not due more to psychic shock than to the anesthetic itself. I have frequently noticed that the patient will recover from the anesthesia in good form, yet will collapse after the effects of the anesthetic have apparently worn off.

Dr. H. C. Brown, Columbus, Ohio. The essayist has presented his subject in a most interesting manner, yet I agree with Dr. DeLong's words of caution. I do not think that we should assume that we have done it all. We shall have to prepare ourselves to meet the position that the medical profession is going to assume in regard to anesthetics. In our state we have a few dentists who are specializing in anesthetics. Dr. Teter of Cleveland, for instance, has been before your State Society possibly on one occasion or two, and has given demonstrations all over the country. Several others in Ohio are specializing in anesthetics, and this has developed considerable jealousy in the medical profession of our state; so much so that, within the past year, the Ohio State Medical Board passed a resolution saying that they considered the administering of anesthetics within the jurisdiction of the Medical Practice Act, and anyone who administers an anesthetic who is not a legal practitioner of medicine is guilty of direct violation of the law. They addressed a letter to the Attorney-general for an opinion regarding this phase of the question, and he practically upheld them. The *Ohio Medical Journal* published an editorial on this subject, quoting the resolution passed by the medical board and giving the opinion of the Attorney-general, with an editorial comment on it. I called the editor's attention to this, in my opinion, very unjust attack by the medical profession upon us, and their unappreciative attitude in this respect, and he said he would be glad to publish my views on this question. I wrote him a letter, which, with your permission, I will read, as follows:

Editor *Ohio Medical Journal:*

My attention has been called to an editorial on "The Administration of Anesthetics by Other Than Physicians," appearing in a recent number of the *Ohio Medical Journal.* Embodied in this editorial is a resolution passed by the Ohio State Medical Board and an opinion by the Attorney-general, covering same. At the close of the editorial you express a willingness to publish opinions of members, and I trust that you will accord me the same courtesy and publish the views of a dentist upon this subject.

I consider the position taken in the resolution and the editorial as unjust, inconsistent, and discourteous to the dental profession, and will, with your permission, give a few reasons which I think may be sufficient evidence to convince the Attorney-general that he was not in possession of all the facts in the case. The closing paragraph in his opinion makes it clear that it was based on the facts presented, and that it was possible for additional information to modify his ruling.

The statement that the editorial and resolution did not have reference to a legal practitioner of dentistry is no consolation to the dental profession. If either recognized such a right it would and should have been specifically stated, and the excuse that the dental profession was given no thought in considering the subject reflects no credit. It is true that dentistry is a branch of medical science, but it is also true that it is a distinct branch and is legalized by a separate legislative enactment.

The state medical board and the writer of the editorial should know that to Horace Wells, a dentist of Hartford, Conn., official recognition has been given for being the first person to use any agent as an anesthetic and to give a public demonstration of his method. This was in 1844, and nitrous oxid was the agent used. In 1846 William T. G. Morton, also a dentist, experimented with ether to produce anesthesia, and met with such favorable success, in a few dental operations, that he later gave a public demonstration of this for a major operation for a physician. When the news of the discovery of ether anesthesia reached London, the physician receiving the information consulted a dentist, who devised an inhaler for its administration, and it was the dentist who first demonstrated its efficiency by extracting a tooth without pain. Therefore you will observe that dentists were most active in the development of anesthetics —and official recognition has been accorded them in this country and abroad. In view of this, it would seem that our rights ought to be fully recognized by the medical profession, and that we should work together in harmony, each recognizing the rights and advantages of the other. This relation will accomplish far better results in our common efforts to educate the public to a proper appreciation of preventive medicine and dentistry.

The dental profession, like the medical, has made decided advancement since the wonderful discovery of Wells and Morton. This is evidenced by the fact that in nearly every state a diploma from a dental college is required as a credential for admission to examination before the state dental boards. The dental law of Ohio provides for this requirement, and the applicant must pass a satisfactory examination in fifteen distinct branches, one of which is *anesthetics*, besides doing a prescribed amount of practical dentistry. The medical law of Ohio does not specify an examination in anesthetics, and upon investigation I find that the board evidently does not consider the subject of sufficient importance to take advantage of its prerogative and give an examination in this most important branch.

I recognize that we have a great state, and am keenly interested in her people and their progress. I also recognize that Ohio has furnished men from all walks in life who have brought honor to her name, and, in this, members of both the medical and dental profession are conspicuous. As a citizen of such a state, I am interested in all that is true advancement and hail its coming regardless of its source, but I consider it my duty and pleasure to guard with an ever-zealous care our inherent rights in such achievements as pioneer members of our profession have given to suffering humanity. In the interest of advancement and protection, I would most respectfully urge the medical board of our state to better safeguard our citizenship by making anesthetics a required branch in their examination, in accordance with authority granted in Section 1273, Revised Statutes. The same interest prompted me, a few years ago, to assume the responsibility in specifying this subject as a requirement in our dental law. This naturally stimulated the dental colleges in giving a more thorough course and the applicant a proportionate increase of study to the subject, as three terms of service on our state dental board convince me that a goodly number of applicants before such boards are much more interested in the subjects required by the boards than in those which are not.

Few dentists are interested in giving other than nitrous oxid and oxygen as a general anesthetic, but many use this in their daily practice, to the great relief of their *clientèle*. However, we have several members of our profession who specialize in anesthetics and are recognized as being quite proficient. One of these has done much to advance this form of anesthesia and has developed a special apparatus for the combining of the two gases, and I am informed he is chief anesthetist to one of the large hospitals in Cleveland.

Therefore, in view of the situation as herewith presented, it would seem to me that a dentist legally qualified to practice in Ohio is both legally and morally protected in the administration of general anesthetics, and I trust, if this question should come up in the future, that either specific exception of the dentist be made, or that the medical board will prosecute such alleged violation of their law, to the end that our rights may be finally determined in court. Personally, I will admit in advance that I use nitrous oxid and oxygen as a general anesthetic when it is deemed necessary, and nothing short of the Supreme Court of our state will convince me that I am exceeding my rights.

Respectfully,
H. C. Brown,
Columbus, Ohio.

Subsequently another letter was addressed to the Attorney-general, and he modified his original ruling to the extent that dentists can legally administer anesthetics in their dental practices. I can see trouble ahead in that respect for the dentist who accustoms his patients to nitrous oxid and oxygen; they will require and will demand this anesthetic in many surgical operations. Persons who take nitrous oxid and oxygen once are very apt to demand it again, and inasmuch as many physicians and some hospitals are not prepared to administer this anesthetic the dentist is placed in a very awkward position, especially if we are going to be practically refused permission to give nitrous oxid or any other anesthetic.

We must therefore stand together, and must look after our own interests. The medical profession, on the other hand, should recognize what the dental profession has done for humanity in this particular. I do not know the situation in Pennsylvania or in Iowa, but I fear that some movement may be started tending to restrict anesthesia for surgical purposes to the medical profession.

The successful administration of an anesthetic for a dental operator requires just as much skill as any other operation, and our activity in the developing of this boon to suffering humanity certainly entitles us to some consideration, especially when many of our profession are equally competent.

Dr. DeFord (closing the discussion). I wish to thank the members of this society for the kind manner in which my paper has been received, and for the very complimentary remarks that have been made about the paper and myself.

In reference to the sentence which Dr. DeLong criticizes, I would say that, on careful reading, it will be found that the sentence does not imply that we have made good and that there is nothing left for us to do. My words were: "*We are making good* in our work," indicating that we are improving, and implying, of course, that we will continue to improve.

We owe Dr. Brown a debt of gratitude for the vigorous fight that he is making in regard to the administration of anesthetics by dentists. A number of you, no doubt, have read his article in the *Dental Summary* for May, and I hope he will continue this fight. In this connection I might mention a very important occurrence of recent date that may be of advantage to us in regard to this matter. At the meeting of the American Medical Association, just closed, a National Association of Anesthetists was organized, and Dr. J. A. Gwathmey of New York—in my opinion the greatest anesthetist—was elected president, and Dr. C. K. Teter of Cleveland—the greatest dental anesthetist—was made vice-president of this association. This organization, although many of the most prominent medical men are back of it, admits on equal terms dental practitioners who are interested in anesthetics. I think there will be a tremendous development in anesthetics as the result of this new organization.

As to the position taken by the attorney-general of whom Dr. Brown spoke, his ruling, in my opinion, was chiefly intended to prevent nurses from giving anesthetics in hospitals; it was aimed at the nurses and not at dentists, but it hits the dentist just the same, and that means that we must face this condition.

Dr. Weaver moved that the society extend a vote of thanks to Dr. DeFord for his interesting paper.

Motion was then made and carried to adjourn until the evening session at 8 o'clock.

(To be continued.)

DENTAL SOCIETY OF THE STATE OF NEW YORK.

Forty-fourth Annual Meeting.

(Continued from page 1041.)

The next order of business was the reading of a paper by Dr. HERMANN PRINZ, St. Louis, Mo., entitled "Filling Root-canals with an Improved Paraffin Compound."

[This paper is printed in full at page 1081 of the present issue of the COSMOS.]

Discussion.

Dr. E. T. DARBY, Philadelphia. I am greatly interested in this paper in general, and especially in the history of root-canal filling, which has been most ably touched upon by the essayist.

Some of you may know that Dr. Edward Hudson of Philadelphia is supposed to have been the first to fill the root-canals of teeth, and he filled them with gold. Dr. Hudson practiced in Philadelphia and left a record as being not only a conscientious Irishman, but a dentist of wonderful skill. I have in my practice an old lady, now 102 years of age, who was a patient of Dr. Hudson's, and strange to say, she has many of her teeth yet. I have a second molar which was hers and had been filled with gold by him when she was a young lady in a boarding school in Philadelphia, eighty or eighty-five years ago. She retained this tooth over sixty years, and when it loosened, she gave it to me. I would be glad indeed if I could say to you that Dr. Hudson devitalized the pulp and filled the canals with gold, but I cannot say that. It is filled on the occlusal surface, and well filled. This operation was done about 1820.

Dr. Hudson was an Irishman, banished for political reasons from his own country. He was graduated at Dublin college, studied dentistry with an uncle in Dublin, came to Philadelphia, and engaged in mercantile pursuits. He made a failure in business and settled with his creditors for fifty cents on the dollar. He then took up dentistry, and after establishing himself in Philadelphia, paid every creditor in full. He was as much respected as any professional man in the city of Philadelphia. He lived in a large double house at the corner of Arch and Ninth sts., which for years afterward was known as the former home of Dr. Edwin Hudson. I have a photograph of a portrait of Dr. Hudson painted by Sully in the early part of the last century.

Dr. Prinz was good enough to send me a year ago some of his root-filling material, and I have used it more or less in practice since.

In speaking of the manipulation of this material, the essayist said that one of the most important items was the dryness of the canal. In the use of a paraffin compound, it seems that absolute dryness is essential. I learned many years ago that, in order to fill a canal properly, it was necessary to ream the canal until access could be had to that canal; then, after having been thoroughly cleansed and dried, it was ready for filling. Paper cones are in my experience the most satisfactory means of effecting dryness. These are followed with a copper wire small enough to enter the canal, and heated to as high a degree of heat as possible without causing pain. Dr. Prinz has suggested the use of an electrically heated wire, and perhaps that is better. If the canal has been thoroughly dried and then moistened with paraffin oil, and the cone of paraffin compound inserted and a hot wire used, it is quite easily filled, and such a root-filling seems to be thoroughly good.

Dr. Alfred R. Starr, New York city. It has been stated that one of the desirable properties of a root-canal filling is the property of permanent antisepsis. While it is true that such a property is very desirable, it does not seem possible to find a material possessing that quality. Dr. Prinz is undoubtedly correct in stating that in order to be effective as a germicide, a material must possess a certain amount of solubility, and this is certainly contra-indicated in root-canal fillings; hence, antiseptics in a filling material intended for root-canals would seem to be useless, except as a means of sterilizing the material itself.

I do not believe in the use of chloro-percha or any of the oleo-resins in filling root-canals except for temporary use, or perhaps in combination with more permanent filling materials. I fail to see how we could have any liberation of chlorin from chloro-percha without a complete disorganization of that material and destruction of its usefulness as a filling.

It may be true that it is impossible thoroughly and permanently to sterilize the dentin of a tooth *in situ,* but I believe the formaldehyd compounds will do more toward accomplishing that result than any other available germicide, especially if accompanied by a thorough mechanical cleansing of the canal.

The judicious use of broaches or reamers in root-canals is of great advantage in many ways. It gives better access to the canal, and, in removing that part of the dentin which is most infected, we remove the infectious material with it, and permit of more thorough sterilization of the remainder of the dentin. The presence of extra-apical foramina might possibly be a cause of reinfection after root-canal filling, and the paraffin compounds ought to be more effective in closing those openings than any other available material, except perhaps oxychlorid of zinc or the resinous materials. Subsequent infection of the apical tissues, owing to the presence of undestroyed germs in the dentinal tubuli, is not possible if the canal is perfectly filled and we have no subsequent leakage about the filling.

It has been suggested that it is possible to have infection of the pericementum because of the escape of the micro-organisms or their products through the small ends of the tubuli and by way of the canaliculi of the cementum, but I do not believe that infection ever occurs in that way. Perhaps we do not give sufficient consideration to the fact that we are apt to have several apical foramina in a single root, but I am thoroughly convinced that little danger is to be apprehended from that source, if we have been careful in sterilization and in thoroughly filling the main foramen. Let me ask how many cases you can recall of septic apical pericementitis occurring about the root of a tooth in which the X ray or subsequent extraction has demonstrated that the main foramen has been perfectly filled. It is true, we can have a pericemental abscess upon a vital tooth, but I refer now only to the ordinary form of alveolar abscess due to infection from the interior of the tooth. I venture to state that you would have great difficulty to recall a single case of that sort in which secondary infection occurred. If this be true, then the statement of Fischer, as quoted by Dr. Prinz, that these accessory foramina are found in about 90 per cent. of all permanent teeth, would seem to have little importance from a clinical standpoint.

The paraffin compound is an excellent material for filling canals of deciduous teeth or those of permanent teeth prior to complete calcification. No other material except the less durable and less tractable resins possesses the qualifications requisite for such purposes. Paraffin will flow into the enlarged portion of the canals, and if any of it escapes through the apex, it will not cause undue irritation. Gutta-percha also is comparatively non-irritating when forced through the apex of a canal, but is not very suitable for filling canals with enlarged apices. I have been using paraffin or a mixture of paraffin and aristol in such cases for quite a long time, and with very good results. In regard to the relative advantages of the compound suggested by Dr. Prinz and other materials for ordinary root-canal fillings, I believe further experimentation is necessary before we can arrive at positive deductions.

In ordinary cases, with canals of the usual size, I would prefer to pin my faith to gutta-percha, using small pieces cut from gutta-percha cones, and measuring accurately to make sure of reaching the end of the canal if possible, but for the smaller canals or for temporary work, I believe the paraffin compound will be of great assistance to us. In using it for other than temporary purposes I would prefer to employ, in conjunction with it, gutta-percha cones, wooden points, or pieces of wire as a means of greater safety. It is not so easy to fill canals in upper teeth with the paraffin compound. It is true that capillary attraction will assist in getting it into those canals, but it cannot be introduced with the same facility as in lower teeth. It is by no means an easy matter to place the patient in such a position that we will be aided by the force of gravitation in introducing the material into the canals of upper teeth, especially molars, and that is one objection which I would have to its general use. The main feature to be determined is its durability in the canal, but, judging from indications and from the careful experiments of Dr. Prinz, it would seem reasonable to believe that it will meet our expectations in that respect.

I do not believe that the ordinary bismuth paste, as recommended by Dr. Beck, is as soluble as some seem to think. I have one case in mind where this material, as shown by radiographs, has remained apparently unchanged for a period of more than a year. If this be true of the paste containing bismuth subnitrate, may we not infer that the compound with the less soluble bismuth trioxid will possess a greater amount of durability?

At the infirmary of the New York College of Dentistry we have had excellent results in filling root-canals with gutta-percha in the manner I have described. We have had radiographs taken of many of our cases during the past year, in order to ascertain the degree of perfection attained by the student or the operator in the use of this material. Some of the pictures show incomplete fillings, while others show that filling material has been forced beyond the apex, although the clinical results have been good. In the case of incomplete fillings reaching almost but not quite to the apex, it may be that we were dealing with multiple foramina of small size, which did not permit the ingress of the material.

I intend to experiment with the Prinz compound at the clinic, with a view to determine, if possible, whether this material will enter those small foramina when the tooth is filled *in situ.* I do not anticipate trouble from forcing a slight amount of gutta-percha through the apex of a canal. The material will become encysted, especially if it is slight in amount and still retains its connection with the gutta-percha inside the canal, and it will not give rise to other than temporary irritation. I have had an example of that fact in my own mouth, and many similar examples in the college infirmary work. The paraffin compound will no doubt be even better tolerated by the tissues in the apical space.

Dr. Prinz's experiments seem to demonstrate conclusively that such will be the case, but until we are more sure of its durability, most of us will probably be inclined to "make haste slowly," and will continue to use the old stand-bys in ordinary cases.

Dr. M. L. RHEIN, New York. Dr. Prinz has presented to us a subject of great importance in his customary masterly manner. The importance of obtaining absolute sterility of root-canals is one of the few items in his paper that I must touch upon. It is true that Mayrhofer and others have been able to demonstrate infection in all the different forms of root-canal filling materials with which they were familiar, but it does not follow from this that the root-canal cannot be placed in such a condition that infection is absolutely impossible. I have tested the technique which I at present use, and which should be fairly well known, as I have demonstrated it a number of times. Until Professor Prinz or someone else can demonstrate that he can find evidence of infection in canals treated by my method, my reply to that portion of the paper is that it is simply a question of faulty as compared with accurate technique. In other words, I maintain that the first essential before any filling is inserted in a canal is, that the canal be absolutely sterile, and I further maintain that that is possible. Having established such a condition, the next prerequisite is that the root-filling material have two qualities—it must fill the root-canal hermetically and homogeneously and it must preserve its integrity. In my opinion, Professor Prinz's experiments with paraffin—which material, as he has demonstrated, has great advantages over any preparation that has been introduced heretofore—have not covered a sufficiently long period of time to prove that absorption of this material is impossible. I believe it will require a longer period of investigation to insure the non-absorbability, for absorption has always been the drawback in the use of a material which is so easily worked as paraffin. I certainly cannot understand the logic of recommending paraffin in open canals; personally, I should prefer it in canals where the foramen is so small that the absorption of this material is practically impossible. I am not convinced at the present time that absorption will not take place; consequently I do not care how much of a coating is produced around the end of the root, if there is danger of absorption, there will be a reinfection of the canal. The real danger lies in reinfection of the canal, and it requires but a microscopical portion of the end of the root as a medium for such reinfection to take place, and having once started, no matter in how small an area at the apex, it has then sufficient material to feed upon as it progresses toward the tubuli of the root. In other words, there are two important places in the canal to guard against reinfection, *i.e.* the apical end and the end facing the pulp-chamber.

In regard to the apical end, I thoroughly agree with what Professor Starr has said, that if the canal is sterile and the operation is conducted under perfectly aseptic conditions, gutta-percha is admirably suited as a root-filling material, for we have known for years of its compatibility with the soft tissues, and its absolute harmlessness, even if a considerable amount is forced through the end of the root. I would rather force one-eighth of an inch of gutta-percha through the end than have it short of the end to even the most infinitesimal amount, because the gutta-percha goes into a place where tissue is generally missing on account of the infection which has taken place, and it does no harm; it is sterile and becomes encysted. In the other condition, however, there is everything to favor reinfection.

In regard to the other end of the canal, I think Professor Prinz was rather thoughtless when he spoke of sealing the paraffin with "oxyphosphate cement"; I do not think he meant oxyphosphate of zinc, because that is a very poor material to seal the end of a root with. The ideal material is the oxychlorid of zinc cement, because it is absolutely impervious to reinfection from the crown of the tooth.

I have one other objection, which is theoretical, to the use of this preparation, namely, that the paraffin will proceed as far as the heated wire, no matter whether it be of the electric or the Evans type. In the fine, tortuous canals that we must fill to the very end, it seems impossible to advance the wire to the very end.

The essayist spoke of the effect of the contraction of gutta-percha from the periphery toward the center. I take issue with him in regard to that contention, as I have taken issue with a great many others who have made this claim. Gutta-percha contracts in the way described because of the faulty technique employed. No one has a right to condemn a material because it is not employed in the manner in which it can and should be employed. My claim is that gutta-percha can be packed in such a way that contraction of any perceptible amount is impossible, simply by packing it with the aid of chloroform carried on paper or cotton wound around the instrument. The gutta-percha is packed into a homogeneous mass.

allowing time for the volatilization of the chloroform. In this way a homogeneous and solid gutta-percha filling is obtained. By this method gutta-percha can be forced through the finest foramina. This is its greatest advantage, and the demonstration of how gutta-percha and chloroform will contract toward the center has no bearing until it can be proved that such contraction takes place in a canal filled in this manner.

This subject is unquestionably of very great importance. I have spoken of the advantages of gutta-percha and chloroform, and I wish to emphasize that gutta-percha, if it is to be used for root-canal filling, must not be softened by any other agent, such as oil of cajuput, etc. While I have assumed that position, no one will be more pleased to adopt the use of this compound than I, as soon as I can be sure that no absorption will take place and that I can force the paraffin down to the uttermost end of each canal ramification, no matter how fine it be.

Dr. W. B. DUNNING, New York. I consider it an honor to be called upon to discuss this admirable paper. This subject has interested me for many years, and a number of years ago I did some simple experimentation of my own, but as I am not a scientific investigator but simply an operator at the chair, my work was of the empirical sort. I tried the essayist's method of filling root-canals with the confidence that fools have in rushing in where angels fear to tread, and somehow or other I had admirable results. The roots that I filled six or seven years ago with paraffin have been singularly quiet, while I have had trouble with those filled by other methods, and this lapse of time is beginning to give me confidence in this material. I confess, however, that several years ago, in talking this matter over with Dr. Rhein and others, I lost a little of my confdence as to the permanence of this substance, and became rather cautious in its use.

It is a source of great gratification to have such a thoroughgoing scientist as Dr. Prinz take hold of this subject and deal with it in a scientific manner. I was glad to learn of the essayist's paraffin compound and its excellence as compared with common paraffin. His experiments give one a great deal of confidence as to the probable lasting quality of the filling material which he suggests.

The subject of root-canal filling is the foundation of our happiness, or, first of all, that of our patients, and we cannot hope to perform successful dental operations if the filling of pulpless root-canals is done in an unsatisfactory manner. In these days we aim at going about our various operative procedures in a scientific way. The tendency is to standardize methods, and instead of having a dozen or twenty ways of performing one operation, our effort is to sift out those that are less satisfactory, and finally hit upon the best method of performing a certain operation. If we can finally decide upon the best method of filling root-canals, it will be a distinct advance.

Oxychlorid of zinc has been spoken of, and we all know, of course, that it is an excellent material, but also that it is a strong irritant if allowed to pass through the apical foramen. It is also a serious matter to remove such a filling in case of trouble. Chloro-percha, which Dr. Rhein speaks of and which he values so highly, is in my opinion a treacherous substance. Dr. Rhein demanded absolute proof of the non-absorbable character of paraffin; then he said that he fills the root-canal with solid gutta-percha worked into the chloro-percha, until all the chloroform has evaporated. Adopting his exact method of requiring proof, I should like to ask him how he knows positively that the last particle of chloroform is evaporated at the apex of the root, from the thick mass of gutta-percha that lies between the apical end and the pulp-chamber orifice of the canal? In other words, suppose that he works out the chloro-percha to his satisfaction, by packing in solid gutta-percha—how shall he know that the last particle of the former has been removed, and if any remain, will he please show why there may not be shrinkage and leakage later on, when that chloro-percha disappears after the tooth is closed up?

As for the fear of being unable to

force the paraffin to the end of the root—in tortuous roots, Dr. Rhein, if I remember correctly, could not conceive how the wire could be carried to the end—I would say that Dr. Prentiss suggested during the discussion that, if this fine wire could not be carried to the end, how would it be possible to remove the pulp? The fine broach must be carried to the end in order to cleanse the root; and if the broach, then this wire can be carried, and the root be filled.

The shrinkage of paraffin away from the center toward the periphery is one of the most admirable qualities of this substance. This tendency means that the periphery of the filling is left in contact with the sides of the canal, whereas, if shrinkage occurred in the reverse direction, we would fail of having this tight joint. By experimentation with paraffin in a test tube we can demonstrate that the periphery is sealed perfectly and there is an opening in the center of the mass in consequence of the peripheral contraction. In the canal this depression amounts to almost nothing, but, if desired, it can be filled with an ordinary gutta-percha point.

I have always used the wire point heated electrically in filling these canals, and at one time I attempted to devise a syringe consisting of a delicate tube with a copper wire running through it. That mechanism was so adjusted that, when the point was heated—electrically—the paraffin could be ejected from this fine tube at a point near the end of the copper wire. Of course the advantage of that instrument would be the forcible ejection of air-bubbles from the canal; the wire point being heated, the paraffin would be maintained in the liquid state. I found, however, that this instrument was not very practical, for the reason that the bismuth subnitrate or zinc oxid which I mixed with the paraffin, being of greater specific gravity, settled to the bottom of the liquid paraffin within the syringe, thus preventing the introduction of the proper mixture into the canal. In this connection I might say that we have no great difficulty in filling canals of lower teeth. In a lower canal gravity will carry these heavy ingredients to the bottom or apex, but in working in an upper canal we have difficulty in coaxing the material upward, and we may not always feel confident of success. Capillarity, of course, aids greatly. If a glass tube is spun to the fineness of a root-canal, it is interesting to see how a liquid will creep up into the tube, even though it be practically inverted; the capillarity will overcome the force of gravity in an astonishing way. I feel, however, that in filling upper teeth there is always danger of air-bubbles, and that a gutta-percha point is of decided advantage in driving them out.

There is one practical disadvantage that I would mention in the use of the essayist's compound. When the roots are used later for crown or for bridge abutments, the paraffin filling is unsatisfactory. In reaming out a root for the reception of a post, we are very apt to pull out the entire mass of paraffin. The attachment between the paraffin and the dentin is not very tenacious, and if we are not extremely careful, the whole filling will be pulled out, and the canal left empty. If this occurs in a wet mouth, we may reinfect the canal, and if any of the paraffin is left between the post and the dentin, in setting a crown the cement of course cannot hold. Therefore, whenever it is foreseen that roots are to be used for crown abutments, it would be well to use some other root-filling material.

As to the antiseptic quality of paraffin root-filling compounds, I have used a small quantity of paraform, which is solidified formaldehyd. At the moment of heating, this is rendered gaseous and permeates the entire mass, thus sterilizing the paraffin at the moment of solidification, which seems advantageous. Dr. Prinz has suggested the use of thymol for the same purpose.

Dr. E. C. KIRK, Philadelphia. Mr. Chairman, so much has been said upon the subject of root-canal filling, and the subject is so interminable, that I do not want to take up your time in speaking on the question. I would like, however, to pay my tribute of respect to Dr. Prinz for the very admirable exhibit he has made of this subject. I take it that it is not his object to review the whole question of root-canal filling, but rather to discuss the availability and desirability of the compound which he has offered for consideration. He has gone into the history of the use of paraffin as a root-canal filling material, and has given, I think, very definite reasons why in a certain selected class of cases, if not in all cases, it is probably one of the best media we have for that purpose.

The essayist has made reference to a note or two that I published on this subject some years ago. I was led to experiment in this work from reading the paper by Mr. Tomes which he has quoted this evening. Having had some experience in histological work, I was familiar with the grades of paraffin used for that purpose, and with the fact that it is of the utmost importance in using paraffin as an embedding material to select a grade of paraffin of the correct melting-point in relation to the nature of the tissue to be embedded; and upon general principles, because of the desirability of having a root-canal filling that is unalterable at the body temperature, I selected those paraffins having the higher melting-points; and feeling the necessity of adding an antiseptic material, I suggested aristol. My first use of this combination was for the treatment of deciduous teeth, in which it was assumed to be useful for temporary purposes. I then came to using it in extremely minute canals where it was difficult to make a filling with gutta-percha cones or a more solid material. The technique suggested by Dr. Prinz we shall doubtless improve in the course of time and modify in some particulars.

I myself am somewhat like the man from Missouri in regard to some of the items he has presented, but we must not forget that it is also a man from Missouri who has brought us this paper. I question from a chemical standpoint his method of dehydration of the canal by means of acetone. The acetone is used, as I understand it, because its hygroscopic properties enable it to extract water from the dentinal tubuli. We know it will do it, and absolute alcohol can also be used for the same purpose, but if we depend upon filling the canal with acetone or absolute alcohol for the purpose of extracting the moisture from the dentin and then evaporating that dilute acetone which remains in the canal by means of hot air or a heated wire, we are simply evaporating the more volatile portion of the mixture and still leaving the moisture in the canal. I think a more appropriate method of procedure would be to put alcohol in the canal, then with wisps of bibulous paper extract this, and next refill with acetone and remove in that way as much as possible of the moisture, finally drying when we have nothing but alcohol or acetone to deal with.

I would raise a question, or perhaps a word of caution, with reference to the addition of the albolene or heavy paraffin oils. You may remember that Dr. Head of Philadelphia at one time very strongly advocated the filling of root-canals with cosmolin or vaselin, which has been referred to by the essayist, and he was compelled to abandon this practice because of the tendency of the cosmolin to permeate the tooth structure and give to the tooth an oily translucency, a "grease spot" appearance which was unsightly, but, aside from that, it was undoubtedly an excellent filling material.

I want to call attention to one or two points in reference to oxychlorid of zinc. Here, again, I think we have gotten a little off the track with reference to the antiseptic properties of zinc oxychlorid. Dr. Rhein has very pointedly called Dr. Prinz to account for suggesting the use of oxyphosphate rather than oxychlorid of zinc as a covering to the pulpal end of the root-canal because of the tendency or the possibility of reinfection in the case of oxyphosphate and the absolute impossibility of reinfection in the case of the oxychlorid. I raise a question of doubt in regard to that statement. Let us not forget that zinc oxychlorid is antiseptic only because of the antiseptic property of the zinc chlorid, which acts upon the infectious material in contact with it before it is combined with the zinc oxid to form the zinc oxychlorid; but I doubt very much whether completely solidified oxychlorid of zinc has any antiseptic qualities at all after complete combination has taken place between the zinc chlorid solution and the powdered oxid. I believe the antiseptic value of the mass is exhibited by the zinc chlorid before it combines with the zinc oxid to form oxychlorid of zinc. So the value of oxychlorid of zinc from the sterilizing point of view depends upon the preliminary sterilizing which takes place before it combines to form the cement. Now, if that assumption be correct, then we have no more danger from reinfection in the case of a cement filling made from oxyphosphate after careful sterilization than in the case of oxychlorid filling. I question the necessity of the germicidal and antiseptic factor which the essayist has introduced into the compound, and I want Dr. Prinz to speak upon this point particularly, for in connection with a root-filling material that will completely obliterate space, like paraffin, I question the necessity for the addition of a positive antiseptic. I think the sterilizing process should precede the filling process, and the subsequent complete filling of the canal by sterile paraffin should be a sufficient safeguard against reinfection.

I want to call attention to this point —that there is an antiseptic value in the physical sense to such preparations as vaselin, petrolatum, and its congeners. We speak of the healing quality of vaselin when applied to abraded surfaces; what do we mean by that? It is a "healing" agent simply because it makes it impossible for bacteria to grow upon that surface; it permeates the micro-organisms or acts upon them in such a way that they are removed from contact with their natural pabulum, out of contact with oxygen. I suppose it is theoretically possible for a mass of bacteria to live in cosmolin, but I have my doubts. The killing quality of hydrocarbon oils for certain micro-organisms is very marked. I remember that I had this impressed on my mind when a large beetle flew into my room one night, and I wanted to kill it without mutilating the body, so that I could preserve it as a specimen, and I put benzol on him; and if he had been struck by lightning he would not have been killed quicker. The benzol rapidly evaporated and there was the specimen perfectly preserved with no injury whatever. I had known the killing quality of benzol, cosmolin, and coal-oil on all sorts of insect life. I believe it kills by cutting off the supply of oxygen, and I believe that action also applies to the lower forms of unicellular organisms. It will kill germs, and hence it is that it possesses what we call a healing quality—which is really not a healing quality at all, but simply a protection to the surface against germ action while it is being healed. Therefore if paraffin has the quality of shutting out the oxygen supply or the nutrient supply from the organisms, then in that we have explained the antiseptic or germicidal value, and if we sterilize thoroughly before the root-canal filling is inserted, and if the paraffin will obliterate sepsis, then I believe Dr. Prinz has demonstrated and brought us a very good thing. He has contributed to the literature of the subject an article which places us under great indebtedness to its author.

Dr. Rhein. Replying to Dr. Dunning, as to the wire reaching the end of any root that a broach would reach for the extraction of the pulp, I am still skeptical. Even if that is possible, there is a class of multi-rooted teeth in which we cannot reach to the very apical end of the root-canal, and in which a small portion of the pulp is left if the ordinary methods are used. With the method that I have advocated, however, all of the contents of the canal can be removed, that is, by the use of sodium and potassium. That little portion of pulp tissue will unite chemically with the potassium and sodium, and we can wash out the débris by the use of hydrogen dioxid solution. Into this very minute space gutta-percha can then be forced, but the question is, Can paraffin really be forced there? I am simply skeptical, and I shall try the material which Dr. Prinz has suggested in order to see what its possibilities are in these very difficult cases, because it is necessary that the very last point of the root-canal be filled.

In reply to the other question which Dr. Dunning asked, as to how I know that every particle of chloroform has been evaporated from the chloro-percha, I have years ago experimented with this technique in packing root-canals out of the mouth, and the result I found was that the chloroform at once passes to both ends of the gutta-percha stopping, and no chloroform can be found in the central portion, as is proved by the inspection of the root-canal fillings. These fillings can be made out of the mouth and left in a solution for a few weeks or months, and the results be observed, in the same way as I have frequently, after a lapse of a great many years, inspected teeth that had been filled in this way, and which had to be extracted for some reason or other.

Dr. Dunning. May I ask how Dr. Rhein tested those cases for the presence of chloroform; whether it was done by splitting the tooth, and trying to determine whether it had evaporated?

Dr. Rhein. The test lies in the result. After the material has been allowed to remain for a considerable length of time, it can be determined whether there has been any contraction of the gutta-percha, such as we will observe in chloro-percha solution left standing.

Dr. Dunning. Was it examined under the microscope?

Dr. Rhein. It can be perfectly examined under the magnifying lens. It is almost impossible to examine this under the microscope, but it can be done by the magnifying lens.

Dr. H. J. Kauffer, New York. I should like to cite a little experience which I have had in the observation of the use of paraffin. In 1904 I took a course in the nose and throat treatment in a postgraduate school in New York, and at that time paraffin was indulged in quite freely for esthetic purposes, especially in cases of arched nose, and a great number of these cases presented at the clinic at that time. In none of the cases was the paraffin absorbed, when paraffin of a high-melting point had been used. In many of these cases paraffin was applied even as high on the cheek as the malar process, and absorption occurred only in cases where low-melting paraffin had been used. The high-melting-point paraffin, melting at about 48° centigrade, remained intact, Dr. Douglass in some of the cases finding it to be intact two years after it had been used.

Dr. D. D. Campbell, Kansas City, Mo. I wish to add a word of commendation for Dr. Prinz's paper. Last year about this time, at St. Louis, Dr. Prinz gave me some of his compound; I have used it since in practice, with excellent results. In some cases, however, I was less successful, which I have attributed entirely to my faulty technique. Minute tortuous canals I do not fill at all; that is to say, I ream them out until they are no longer tortuous, and then fill them. I think you should be grateful to Dr. Prinz for coming here from Missouri, and presenting to you this excellent paper. If you could see him in his laboratory, I know you would appreciate his work, because he goes into the minutest detail in order to obtain such excellent results as he has presented this evening.

Dr. Prinz (closing the discussion). I am extremely grateful for the liberal discussion that my paper has been given.

The point that I want to bring out is that I am sure that this method means an advancement over the ordinary methods of filling root-canals, even though perhaps not in all cases. I have tested this method for two years, and you have heard others say that they have tried it, with gratifying results. It remains for you to work out the best technique for the application of this method—as it is impossible for one single investigator to solve the question of the selection of the material and the best technique for using it; and sometime in the future I hope to hear from you. Some of you will probably remember that three years ago I read here a paper on the subject of local anesthesia; since that time a good many practitioners have adopted that method, and many of them maintain that they cannot get along without it. So I hope that three years from now, when I come back to New York, many of you will have tried this method and found it valuable after all. We can obtain certain results in the laboratory, but this work must be supplemented by the practical application of methods in the mouth. At any rate I can assure you that you will not have any dangerous results. I am quite sure, in fact, that in spite of Dr. Rhein's remarks, you cannot do any worse than he does.

There are one or two phases that I wish to comment on in closing. Dr. Kirk raised the question as to the antiseptic value of this compound. I am sure that Dr. Kirk misunderstood that portion of my paper. I said that I have added an antiseptic to the compound, not for its antiseptic value in the root-canal, but for the purpose of preserving the sterility of the compound itself, because I know that it will be handled. I do not wish to be understood as saying that the antiseptic has any influence on a septic root-canal, but I contend that the compound is in a sterile condition, and when it is properly manipulated and placed in a sterile canal, a sterile filling will be obtained.

I think you will find that this preparation can be manipulated a little more easily than gutta-percha, and that it can be placed in canals in which it would be extremely difficult, if not impossible, to place gutta-percha. If a little of it passes through the apical foramen, there is no need for alarm, because it will mold itself around the apex of the tooth, and remain there.

Someone has said that a period of two years is not sufficient for testing this preparation. In doing laboratory and clinical experiments, we have to stop some time, and I think that two years is sufficiently long for testing the value of such a material as I have presented to you. It now remains for the general practitioner to test it and work out its usefulness in actual practice.

Regarding the commercial preparation of this material, I have asked the S. S. White Dental Mfg. Co. to prepare it for the profession, and they have consented to do so. I have given their chemist personal detailed instructions; he is experimenting with it at present, and by the time this essay will be published in the DENTAL COSMOS I am quite sure the firm will be ready to supply the demand. I am not financially interested in this compound; I simply want the profession to be able to obtain it manufactured according to my directions by a firm which is absolutely reliable.

I wish to thank this society for the very kind reception it has given me.

The meeting then adjourned until Friday, at 2 P.M.

(To be continued.)

SUSQUEHANNA DENTAL ASSOCIATION OF PENNSYLVANIA.

Forty-ninth Annual Meeting, held at Wilkes-Barre, Pa., May 21, 22, and 23, 1912.

(Continued from page 1049.)

WEDNESDAY—*Afternoon Session.*

The meeting was called to order at 3 o'clock on Wednesday afternoon, by the president, Dr. F. L. Davenport.

The President appointed Drs. Stratton, Seip, and Jones as the committee to draft resolutions on the death of Dr. Hollister.

The next order of business was the report of the treasurer, Dr. C. C. WALKER, which was approved as read, subject to the approval of the Auditing Committee. The President appointed as such committee Drs. McHenry and Laubach.

The next order of business for the afternoon session was the reading of a paper by Dr. L. C. LEROY, New York, entitled "Atrophic Alveolitis."

[This paper is printed in full at page 1095 of the present issue of the COSMOS.]

Discussion.

Dr. E. J. DONNEGAN, Wilkes-Barre. I am not very familiar with the etiology of pyorrhea and have spent most of my time in the local treatment of this disease. I am not at all convinced that the local treatment is always sufficient, for time and again I have obtained apparently good results, but had the patient return, and had to repeat the work. What has always puzzled me most about pyorrhea is the manner in which calculus is deposited in some patients' mouths. In some cases within four or five weeks heavy deposits of calculus appear in one patient, while in another there will be practically very little. I think, therefore, that Dr. LeRoy is working in the right direction in studying faulty nutrition, as that is probably the secret of the whole problem, and I hope he will keep up his researches and give us more information as to results.

I recall the case of a large man, whose business kept him out of doors all the time. When he came to me, I suspected that he was a diabetic, which he confirmed. He had slight malocclusion, and, as he was so large, I thought he was a heavy eater. His condition was serious when he came to me, and he had been practically given up by his physicians, and during a short period previously he had lost fifty pounds in weight. On examination I found that every one of his teeth was practically surrounded by pus. I administered prophylactic treatment, and told him to stay out of doors in the fresh air and sunshine, and drink plenty of buttermilk.

I spoke about this case to several physicians, who said that the trouble was probably not due to diabetes, but to pyorrheal infection. After following the treatment prescribed, the patient improved remarkably.

One of the patients who was present at the clinic today is a clergyman from Scranton, with normal occlusion and no caries in any of his teeth. Dr. LeRoy immediately diagnosed the man as an over-eater. Many of these cases are due to over-eating associated with malnutrition. On the other hand, we find cases, like the young woman in the clinic this morning, who are probably not over-eaters; in this case, however, malocclusion was present. Again, working men who work out of doors, exercise constantly, who evidently eliminate fairly well, and certainly perspire enough, exhibit pyorrhea.

Dr. LeRoy's instruments are the best that I have seen for local treatment. The average practitioner is unable to diagnose pyorrhea. All he looks to is the cleaning of the surfaces of the teeth and removal of deposits about their surfaces, instead of examining the soft tissues for inflammation. If he finds pus around the teeth he diagnoses it as pyorrhea, but he never looks for what Dr. LeRoy calls alveolitis, before the pus stage appears. Most of us have made the mistake in years past of looking at the teeth, but not at the gum tissue, and when we had a case in which the gum was receding, we did not take a probe to ascertain if any necrotic condition was present. We scaled the teeth, but probably did not go far enough and curet the alveolus; we used sulfuric acid or some acids for that purpose, but never produced a good condition.

I was glad to hear Dr. LeRoy speak of the question of spending time in this work. Some time ago, one of my dental brothers asked me: "Do you take time to go over all the surfaces of the teeth and polish them?" I said: "I certainly do." He replied: "How do you find the time?" That is the question that is confronting us today, how to find time. We find time for making shell crowns and fillings, but we cannot find time for preventing pyorrhea.

I should like to ask Dr. LeRoy if he does not consider the practice of wedging teeth for separation a bad procedure, especially if cotton wedges are forced between the teeth and crowded down on the gum septum to make space. It has often occurred to me that we never should wedge teeth apart at all. The constant hammering, also, that is applied in condensing gold in a cavity seems very detrimental to the soft tissues.

Dr. E. S. Filbert, Pottsville. It will be the purpose of these few remarks to touch upon some points mentioned by Dr. LeRoy and to elaborate upon others.

"The first cause in this process of deterioration is based on nutrition, viz, the habit of imperfect mastication and overeating, which habit is rarely, if ever, overcome."

Owing to the length of Dr. LeRoy's paper, it was impossible for him to lay as much stress upon this point as it deserves. To my mind, this point is one of the most important to bring to the attention of the profession and the public. But where should we begin? The school room and the lowest grades are the proper places, so that future generations may profit by our teachings. It is not only necessary to talk to the children, but it is equally important to lecture to the mothers and so instruct them that they will see that the children follow directions. Cleanliness is our watchword.

Dr. Clapp in his paper of yesterday said: "The first thing to do when a patient presents is thoroughly to clean the oral cavity." You will notice that he said "the first thing." This is extremely important, as you can easily judge from the remarks that have preceded these.

That the jaws are less strong and the alveolar process is less resistant, as we reduce their work, is a conclusion at which one must inevitably arrive who gives thought to this subject. Huxley and Darwin both noted this fact.

Dr. Riggs believed and stated in 1867 that pyorrhea was in part constitutional and in part due to an overcrowded state of the teeth, and that the stain seen at the necks of the teeth was due to an acrid secretion of the gums. Dr. Talbot teaches us that the disease is of both constitutional and local origin. So that, among prominent men in our profession, we find a great variation of opinion.

Upon the best authority, it may be stated that the susceptibility of tissues to the attack of irritants, of whatever nature, varies greatly in different individuals, and that tissue character is largely influenced by heredity.

It can scarcely be said that diseases like pyorrhea have their inception without local irritation, whatever the predisposing causes may be. Any irritant, no matter of what nature, which impairs the integrity and continuity of the gingival margin, may be an exciting cause of pyorrhea. Systemic conditions or a constitutional diathesis without local irritation do not produce pyorrhea. In other words, pyorrhea is preceded by a lesion of the gingival margin.

The deposition of calcareous salts from the saliva upon the necks of the teeth is the usual form of irritation; next in importance may be classed the nests of putrefaction and fermentation about the gingival border and interproximal spaces; again, mouth-breathing dries the mucous membrane, and that organ's function is interfered with. Banded crowns, careless use of ligatures, and cavities afford a nesting-place or incubator for millions of bacteria.

When a lesion is established, the staphylococci are given an opportunity to get in their work of infection; the integrity of the gingival border is broken, and the disease progresses from one tooth to another. The rapidity of the progress depends largely upon the character of the gum tissue, and upon the patient's resistance to infection—in other words, upon his opsonic index.

Dr. F. M. WILLIS, Ithaca, N. Y. For a long time I have been trying to decide as to whether pyorrhea is due to local or constitutional causes, and I have come to the conclusion that it is due to both. In other words, it is a local manifestation of a constitutional disorder. Its cause is undoubtedly the same as that of rheumatism, gout, various heart troubles, Bright's disease, and other affections, viz, the complex system under which we live at the present time—our method of eating, the foods we eat, our everyday life, our work, and all that makes up the complex life that we live today.

Last fall I attended a convention at Syracuse, and read a paper somewhat similar to the one Dr. LeRoy has just read, calling attention to these conditions and the bearing I considered they have upon people's lives. The paper received some commendation, and I submitted it to the DENTAL COSMOS, but Dr. Kirk wrote that what I had said might be true, but that the relation of cause and effect in the conditions reported was not made out with sufficient clearness to warrant its publication in the DENTAL COSMOS.

In my opinion, there are nearly as many kinds of pyorrhea as there are people. There are many cases of pyorrhea in which the local treatment does not seem to be effective, and others in which systemic treatment seems to be of no avail. I do not believe that over-eating is always the cause, because my patients are not all so wealthy that they can afford to over-eat. On the other hand, it has been noted that people who do not have sufficient to eat exhibit decided cases of pyorrhea.

In my belief pyorrhea can be cured, under two conditions; first, if the patient revolutionizes his method of living, stops drinking and eating too much and unsuitable food, keeps moderate hours, and does not pin himself down to an occupation that gives him only mental and no physical exercise. If the patient can be induced to do this, and gives the dentist a chance to do what he can locally for the teeth, pyorrhea can be cured.

In regard to instrumentation, its great difficulty has been exaggerated, for any dentist who can treat root-canals properly has sufficient skill to treat pyorrhea. One of the reasons why many dentists refuse to treat pyorrhea is that we have not the courage to charge adequate fees and make the patients pay them. Pyorrhea is preventable, and it is our duty to prevent it in our patients.

Dr. S. H. GUILFORD, Philadelphia. The essayist has given us a very good *résumé* of pyorrhea.

There is one point that I should like to emphasize, and that is the fact of so-called pyorrhea being a constitutional disease to a certain extent. Usually, when a paper is read before a society on the subject of pyorrhea, a general statement is made as to what the disease is, and then the essayist goes on to explain a special set of instruments and the delicate sense of touch which it is necessary to develop in order to operate successfully, and thus the mechanical side is treated largely. There is some reason for that, perhaps. We are all mechanical in our tastes, and anything that can be done on a tooth interests us more particularly than anything done in another way without the use of instruments; in presenting this subject to readers, authors have therefore been in the habit of emphasizing the manipulation of instruments. They do this because they claim that they are practicing in that way and obtaining good results. If one looks over the papers on pyorrhea that have been published within the last few years, he will find statements to the effect that the men who have resorted to manipulative treatment of pyorrhea have obtained good results; that the teeth have become firm again, the gums healthy, and the patient has been relieved of all pain and cured. Those, however, who speak of these cases as cures are deceiving themselves. They have good results, it is true—and they call us into their offices to look at them. But how long will these cases remain cured if the patient is not seen at regular intervals afterward? It is imperative to keep up the treatment. If it is stopped, the disease returns, and the patient loses his teeth. Such is the history of cases of that kind. The reason therefor lies in the fact that the operator has not gone far enough. Instruments are most valuable and absolutely necessary, but at the same time they are only a means to an end, a help toward a cure. After the operator has noticed that a patient is afflicted with pyorrhea, he should at once infer that constitutional conditions may be responsible for it. The case should be examined carefully, and, if found advisable, the patient should be recommended to change his method of living. Dietetics should assist the operator in his instrumental treatment. Think how differently we proceed as compared with the intelligent physician: A person troubled with headache may go to a drug store, purchase some advertised nostrum, use it and obtain temporary relief, but if he were to apply to an educated physician the cause of the trouble would be inquired into, and the case treated along scientific lines. The physician would begin at the bottom and work up, and that is what we must do. What would you think if an individual, suffering with an eruption on the face, applied some recommended ointment and expected permanent relief? An intelligent physician would try to find the systemic cause, and treat the case accordingly. And so I cannot understand why some practitioners look upon pyorrhea as purely a local trouble and to be treated by instrumentation only. Those practitioners who treat this disease from a purely mechanical standpoint justify themselves by arguing that if the affected teeth are extracted the disease disappears, and therefore it must be of local character. This is incorrect reasoning, for while extraction does check or correct the oral manifestations of the disease, it does not alter the underlying causes, and the patient may continue to suffer from the same conditions in other parts of the body.

Those who wish to treat pyorrhea intelligently should follow the plan Dr. LeRoy has described, viz, find out the cause and remedy it. There are so many arguments in favor of the fact that pyorrhea is a constitutional disease that I do not see how that aspect of the question can be disregarded. You have all had experiences, I think, that should cause you to favor the double causation theory.

Many years ago a lady came to me with an upper lateral incisor so loose that it was almost ready to drop out. It was elongated, and pus was exuding from a pocket. I treated the case most carefully by instrumentation from time to time, but did not seem to make much progress toward a cure. Later the patient entered a hospital and was operated upon for some organic trouble, and when she returned to me all symptoms of pyorrhea had disappeared, and they have never returned. I did not effect the cure; the change of conditions was what produced it. The tooth is today as firm as any tooth in that patient's mouth.

Cases like this—and they are not infrequent—bear strong evidence of the part played by constitutional conditions in the causation and continuance of pyorrhea.

Dr. LeRoy (closing the discussion). In regard to secondary hemorrhage, due to unduly severe curetment, I should say in addition to my remarks, that we cannot treat these conditions with too much care, if we would obtain the best results. No ragged ends of tissue should ever be left, for repair cannot take place until sloughing has relieved the parts of the dead tissue. I was called upon by a dentist in New York in a case of hemorrhage. It was stopped by packing the pockets with a 5 per cent. solution of ferric perchlorid. The blood continued to ooze slightly for some hours, and then was controlled. Hemorrhage is liable to occur owing to the great congestion which follows curetment of the alveolar tissues. When curetment is indicated, we must carefully discriminate and exercise our best judgment, for it must be remembered that these diseased bony tissues have a very low vital resistance. In necrotic areas, of course, we must remove the dead tissue, but hard-earned experience determines what is necessary to do, and the limits to which we may go.

Wedges and ligatures have been the cause of many recessions which have subsequently become pyorrheal pockets. Pyorrhea established by injury to the tissues in this way is readily relieved, but it will recur in the same way as any other form of this disease, unless we prevent the recurrence of the trouble which first established the pyorrhea. Concerning Dr. Donnegan's and one of the other cases, which someone said could not be ascribed to hypernutrition, let me say that subnutrition can be a cause of this malady as well as hypernutrition. If the diet of the individual is such that the ingredients required for the maintenance of correct physiological function are not present, or in diseases where suboxidation or subhydration occurs, a condition of subnutrition can obtain.

Dr. Willis cited a case in which the teeth became tightened without any instrumentation. The hygienic measures adopted in that and similar instances of cures were enough to restore physiological balance, and to make the local disease disappear. As was mentioned in my paper, I have known of cases in which the keeping of the mouth in a hygienic condition without any instrumentation whatever, was sufficient to stop the manifestations of pyorrhea alveolaris. In some cases, particularly when there is no calcular involvement, vaccines are undoubtedly valuable. I do not wish to be understood as contending that other efforts are of no value. I believe in all of them. I have laid stress in my paper on what I believe to be the most important factors, the causes that underlie this disease, viz, impaired function brought about by hypernutrition or subnutrition, and perverted function, due to suppression of the eliminating function, as mentioned by Dr. Guilford.

There is a class of patients whose habits are not sedentary and who perspire a great deal, but it is safe to say that the majority of these are food-bolters, which is proved time and again by the recurrence of the disease in some form or another.

I have not claimed that so-called pyorrhea depends exclusively upon the few causes that I have mentioned. I have not dwelt upon infection at all in my paper; yet anything that lowers functional activity can play a large part in the causation of pyorrhea.

As to the suppression of the disease, I want to cite one case in particular. I made a profound impression on the mind of a patient who came to me several years ago suffering from calcular deposits on the teeth, with the attendant physical phenomena. This patient was a man of sedentary habits, who liked good living, but who was careless or ignorant about hygiene. I always try to instruct my patients how to overcome this disease, and in answer to this man's many questions, I advised that he change his way of living. He subsequently joined the New York Athletic Club, and became an athlete. He took up athletics most seriously, and, to my amazement, a few months after he started training the pyorrheal symptoms disappeared. The calcular adhesions were absorbed. He, his friends, and his family marveled at his physical improvement. All functional and oral disease disappeared, and he said he felt rejuvenated. He kept up training for several years, cutting down his diet so extensively that he reduced his vital resistance to such a degree that he gave up business and athletics in an attempt to build up again. One day, however, he had a hemorrhage. The subsequent history of this case is the same as all others of its kind—he died. This, of course, presents the other extreme; he carried a sound principle beyond the bounds of reason, but his case indicated to me the value of certain physiological principles, and sustains my theories as to hypernutrition and subnutrition.

As an instance of the importance of the oral cavity as a diagnostic medium, let me cite the following case: A man of sixty-odd years, whom I have had under treatment for a number of years periodically, came to my office a short time ago, after an absence of probably two months. He had been ill with some form of cardiac neuralgia since the early part of winter. He said that up to this time he had been able to keep his teeth free from adhesions, but I noticed great areas of gelatinous plaques, which somewhat alarmed me, because of their physiological significance. I subjected the patient to the usual most thorough prophylactic treatment. He assured me that he had not relinquished his part in the care of his teeth. I had every reason to believe this, because of the evidence of prolonged fastidious care. He returned a week later, and in spite of the strict attention given to his teeth and his greater vigilance, I noticed that the mucoid or gelatinous adhesions were quite profuse. I again put his mouth in as good a condition as I was capable of doing. He felt quite satisfied that his medical advisers, being men of the best standing, had done everything possible to relieve his physical setback of the winter, but admitted that they were not clear as to the real cause of the trouble, though he had been relieved of the severe neuralgia about the heart. This patient died that night during a cardiac paroxysm. I feel certain that his death was the result of a systemic trouble, not primarily cardiac, from a physical disturbance manifesting itself in the mouth. It has remained for the dentist to call to the attention of the physician the great importance of the tissues of the oral parietes in the diagnosis of diseases in general.

The time is here when physicians will have to consider this more carefully than heretofore. Cases like that I have cited are not uncommon; it is only one of a number in which death has followed these peculiar oral manifestations. I recall many of a similar nature.

I wish to thank the members of this society for the kindly reception they have accorded me and my paper.

The next order of business was the reading of a paper by Dr. S. H. GUILFORD, Philadelphia, Pa., entitled "Orthodontia in Its Relation to Pyorrhea and Oral Hygiene."

[This paper is printed in full at page 1123 of the present issue of the COSMOS.]

Discussion.

Dr. L. C. LEROY, New York, N. Y. I was very glad that Dr. Guilford had elected to show us the important relationship between orthodontia and pyorrhea alveolaris. His paper is particularly interesting to me, as he treats the subject from the standpoint of my specialty. It is absolutely true that teeth in malposition cannot but invite disease, the weakening effects of which will finally cause the tissues to succumb.

The following paragraph was of greatest significance to me: "With the frightful ravages of pyorrhea visible on every hand and steadily increasing, with which we have at best been able to contend with only partial success, it behooves us to seek out all of its causative factors in order that preventive treatment may be resorted to, and the disease checked." As I said in the paper which I read earlier in the day, my efforts have been directed to seeking out the causes which underlie pyorrhea. I do not take the stand of the average pyorrhea specialist in contending that this disease is absolutely curable by local means. I have been willing to subvert my own interests in an effort to establish some means whereby we can get rid of the local manifestations of this disease, which does not discriminate in favor or disfavor of malposed teeth, but attacks perfectly well-posed organs as well, and which we may expect to proceed even after the regulation of teeth, probably for years after the orthodontic procedure has been completed. Orthodontic treatment itself involves the possibility of contributing an element toward the establishment of this disease, and therein lies the weakness of orthodontia appliances and the regulating process. I have seen instances where the teeth were moved more rapidly than they should have been, both sides of the mouth being operated upon at the same time, with the almost unavoidable inflammation of the peridental membrane—if not sufficient to cause serious complications, yet enough to impair the function of the masticatory apparatus. Such impairment of function sometimes increases the habit of bolting food which the child has perhaps already acquired, and such bolting, in turn, brings about a condition of malassimilation and the development of toxins which pervert the other functions.

While I was engaged in general practice and did little orthodontia work, I learned the lesson that it is wise to operate on one side of the mouth only, since simultaneous movement of the teeth on both sides of the mouth causes soreness. In this way the degree of impairment of function is minimized. Orthodontic procedure also involves a possibility of destruction of interdental tissue, for, when the teeth are moved, the interdental space is impaired or widened, continuity is broken, and food can be crowded into it quite readily, and destruction of the dental ligament can take place, which later in life may mean an area for attachment of infections which will cause serious disturbance. The need for orthodontia treatment is great, as we all know, and there is no question that it is one of the greatest factors in preventing certain forms of pyorrhetic conditions later in the life of the individual. The science of orthodontia has certainly made great strides in the last twenty-five years. We have seen orthodontia in years gone by practiced in such a way that it was more of a menace than a benefit; we have seen teeth regulated without any regard to the conditions of the mouth or the external features, but the strides that have been made in that direction are such that the advanced orthodontist has adopted entirely new principles and methods.

In the same proportion as the teeth are out of alignment are they in danger of subsequent trouble.

The loss of teeth is a most serious matter, as has been suggested by the essayist. My father, although a dentist, in the early period of my life concurred in the extraction of some first molars, which was at that time thought good practice. One or two of my first molars became carious while my father was away from New York; they had gotten beyond his control, and I suffered from toothache. I was taken to a friend who thought it good practice to extract these teeth, and who proceeded to do so. As I have said before, I have offered but a few papers before dental societies until recently. One of the reasons is that my power of enunciation was such that my voice carried very poorly, and I was subconsciously laboring under a defect. That defect in my enunciation also affected my physiognomy. As I turn my face laterally, I shall put my lower jaw in the position in which it was before I instituted treatment [illustrating]. That was my normal occlusion at that time. I have changed the position of my lower jaw by changing the occlusal planes of the teeth, so that I can bring my jaw forward in speaking, and thereby overcome, to a certain extent, the defect in enunciation; but when my jaw is retracted, as you see now [illustrating], the whole contour of my face is different, my jaws being in a different relation to each other. Although the conditions are not as they should be, I have brought about an improvement in physiognomy and power of voice. These conditions could have been treated by an expert orthodontist at the present time more effectively, but the little that I have been able to do myself has given the face a little more character than when the chin was in a receded position.

The movement of roots is absolutely

necessary, and the true orthodontist of today, of course, will not stop short of perfect occlusal relationship, which cannot be accomplished as a rule without root-movement. Yet the orthodontist has much more to accomplish. He must devise a means of attachment of his appliances which will preserve and even protect the very important dental ligament, which he too seldom does now. Dr. C. N. Johnson's words should always be remembered as one of the most important axioms in orthodontia: "If this rope-like border be impaired in any way, it seldom, if ever, is restored again."

Dr. W. W. Belcher, Rochester, N. Y. Years ago, I gave up the practice of correcting irregularities of the teeth, because I realized that it could be much better done by the specialist.

One great advance in the regulation of teeth, in my opinion, is the use of pure gold for the appliances, which has been largely adopted by the successful orthodontist. I do not know how the orthodontists are here, but in New York most of them are very careless of the oral conditions. Sometimes, after a denture has been regulated, one or two teeth are badly attacked by caries. I think the orthodontist should have a tooth-brush for every one of his patients, and should see that they thoroughly cleanse their teeth at each treatment. I try to keep track of the children whom I send to the orthodontist, and by giving them prophylactic treatments during the period when their teeth are being regulated, I have been able to avoid carious conditions. I think that some orthodontists in the past have been very careless of the oral conditions.

Dr. J. G. Lane, Philadelphia. I am certainly glad to hear a paper of this kind, because it is indeed a step in the right direction. To a person who has not given much attention to this subject, it might seem a long step between malocclusion and pyorrhea; but this step, even though it seems long, is nevertheless very short.

The statement was made by the essayist that orthodontia might be defined as "the science and art of restoring malposed teeth and arches to their normal position and relation, and the prevention of malposition by early oversight and anticipatory methods." I would like to add one more condition to his definition; that it is the restoration of the normal function of all the tissues involved. In my opinion the restoration of function has more to do with success in our work than any other one factor. The peridental membrane is a peculiar tissue, and possibly one of the most highly organized tissues in the body. It has possibly a greater variety of genetic cells than any other tissue in the body. These cells become latent or active as needed; unless the teeth are put into the proper condition and position for normal function, the peridental membrane will not functionate normally, and its cellular activity will be correspondingly suspended. It would seem hardly possible that the interproximal complications which follow later in life are due alone to food forced between teeth in improper relation to each other, causing what is designated as "meat-holes." This, of course, has its significance, but I think that abnormality of function affecting the peridental membrane has also a great deal to do in causing the breaking-down of the dental ligament, and really causes, or at least more readily allows, pyorrheal conditions to occur. Therefore it seems pertinent that Dr. Guilford should include that one factor in his definition of the science of orthodontia, viz, the restoration of function.

Dr. Guilford refers to the fact that orthodontic procedures should be instituted as a measure preventive of pyorrhea; with this we must all agree. Orthodontic measures could in no way be effective after pyorrhea is present, because if pyorrhea has developed it has involved the tissues upon which a successful orthodontic operation would have to depend. Pyorrhea, moreover, rarely, if ever, develops at an age when orthodontic procedures are advisable, but at a time when the genetic or restorative functions of the peridental membrane are very nearly at an end. For example, at from six to ten years of age, by gentle mechanical stimulation we can cause the peridental, the periosteal and adjacent tissues to grow and deposit new bone where it is needed. The old idea that the cortical plate of the alveolar process moves bodily is a mistake; also that in moving teeth here and there the processes of absorption and resorption constitute the entire physiological change in the alveolar process. These processes do occur, to be sure, but there is also a quite decided building in advance, while in the adult this growth and development of bone proceeds very slowly, if at all.

Dr. LeRoy recommended that one side be corrected at a time, in order that the function of mastication be not interfered with. It is almost invariably the case that, if one side is in malocclusion, the other side is also, and rarely if ever can we correct either side without interfering with the function of mastication to some extent. Correcting one side at a time, therefore, means prolonging the period of interference with mastication. Such a procedure would be very unscientific.

Dr. Belcher referred to the use of pure gold in appliances. Pure gold is not used at all.

Dr. Belcher. I meant the use of pure gold instead of German silver, on account of caries.

Dr. Lane. From a bacteriological standpoint German silver is better than gold. There is more possibility of caries with gold than there is with German silver. Any corrosion that may occur in German silver is at once germicidal; this has been proved conclusively. An alloy of gold and platinum is used in cases where a greater range of elasticity is required than can be obtained with German silver. When the effect of the corrosion of bands would be unsightly, 20-karat plate is used. Platinum also is employed for the same purpose.

We have to agree with Dr. Belcher that in many cases the hygienic conditions are not as good as they should be where orthodontic appliances are present; but it must also be remembered that it is difficult to maintain hygienic conditions, for various reasons. The tissues are more or less sore to the touch, the teeth are very sensitive, and the patient cannot be expected to do as well under these conditions as if such fixtures were not present. It is, however, the duty of the orthodontist to look after the patient in that respect at each visit, and take proper steps to prevent the teeth from being injured.

Dr. Guilford mentioned the splinting of pyorrheal teeth for the purpose of holding them. While this may be irrelevant to the subject of the paper, I would say that splinting of the teeth is good as a temporary measure, but is poor as a permanent measure, very poor as a hygienic measure, and poorer still from the viewpoint of encouraging the peridental membrane to do its work. If two teeth are splinted together, the function is taken away from that tissue for the time being, and the same condition obtains as if one were to wear his arm in a sling for a long period, then take it out and expect it to be normal. It would *not* be normal, but would have become abnormal through lack of function. Unless there is function there is no restoration. The only possible advantage of splinting lies in retarding for a time the progress of the pyorrhea. Thus, while splinting is a good temporary measure for retaining teeth possibly a little longer than they could otherwise be retained, it is not a success as a permanent measure, and should not be considered as such.

Dr. Knox moved that the essayists of the meeting be extended a vote of thanks by the society. (Motion carried.)

The meeting then adjourned until Thursday afternoon.

Thursday—*Afternoon Session.*

The meeting was called to order on Thursday afternoon, May 23d, by the president, Dr. Davenport, at 2.30 o'clock.

The first order of business was the report of the committee to draft resolutions on the death of Dr. Hollister, which was presented by the secretary, Dr. Donnegan.

Motion was made and carried that the resolutions be incorporated in the minutes of the society, and that a copy be sent to the family of the deceased.

The Auditing Committee, through its chairman, Dr. HEFFERNAN, reported that they had audited the books of the treasurer and found them correct.

Motion was made and carried that the report be accepted.

The secretary, Dr. DONNEGAN, presented the applications for membership of forty-two applicants.

Motion was made and carried that the rules be suspended and the entire list of applicants be elected to membership in the society.

REPORT OF COMMITTEE ON PRESIDENT'S ADDRESS.

The Committee on the President's Address, Dr. S. B. SPENCER, chairman, then made their report, as follows:

Your committee appointed to take action upon the President's address beg to report that we heartily agree with the president in the stand he has taken on the subject of oral hygiene.

It would not seem out of place, and your committee recommend, that the subject of the National Protective Association, in connection with the Taggart litigation, mentioned in this address, be given time for consideration during this meeting.

It is recommended that this society go on record as to its attitude toward the appointment of a state inspector under the control of the state society as suggested by our president.

We agree that the semi-centennial of the founding of this society should be celebrated in a fitting manner, and would ask the hearty support of each member to that end.

Respectfully submitted,
L. T. WASLEY,
S. B. SPENCER,
Committee.

Motion was made and carried that the report be accepted and spread upon the minutes.

The financial secretary, Dr. KNOX, presented a number of bills, which on motion were ordered paid by the treasurer.

ELECTION OF OFFICERS.

The next order of business was the election of officers, which resulted as follows:

President—Dr. C. S. Van Horn, Bloomsburg.
First Vice-president—Dr. W. C. Middaugh, Easton.
Second Vice-president—Dr. T. W. Thomas, Wilkes-Barre.
Recording Secretary—Dr. E. J. Donnegan, Scranton.
Financial Secretary—Dr. G. C. Knox, Scranton.
Treasurer—Dr. C. C. Walker, Williamsport.

Dr. BULL moved that the secretary of the association be directed to draft suitable resolutions of thanks to the Wilkes-Barre *Record,* the Wilkes-Barre *News,* and the two Sunday papers for their kind and courteous treatment in publishing reports of the oral hygiene meeting in particular, and of the convention in general.

The motion was carried.

Dr. DONNEGAN moved that the clinicians, essayists, and Dr. Anthony of the DENTAL COSMOS, be extended a vote of thanks for the part they have taken in the meeting. (Motion carried.)

Dr. DONNEGAN moved that the secretary and incoming president be empowered to draw on the treasury during the coming year for a sum not exceeding one hundred dollars.

The meeting then adjourned until the next annual session.

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PHILADELPHIA, OCTOBER 1912.

EDITORIAL DEPARTMENT.

THE WASHINGTON MEETING OF THE NATIONAL DENTAL ASSOCIATION.

A LARGE and highly representative gathering of dental practitioners, geographically considered, constituted the annual convocation of our National Dental Association at the Washington meeting just closed. Members and delegates from all sections of the United States, and not a few distinguished European visitors, participated in the several features of the program, contributing to the general success of the meeting.

Among the important things accomplished was the final adoption of the new Constitution and By-laws, by which the plan of reorganization in process of development for the past several years has become at last effectively realized.

The need for reorganization has long been apparent. The plan under which our national body has been operated is a relic of the past that long ago became obsolete as an effective scheme for conducting the work of the National Association. Interest in the organization as such has been waning from various proximate causes, but all having their deeper origin in the lack of an intelligently conceived and practically working organic code of rules adapted to the successful development of the association from a national point of view. Indeed, the National Dental Association had become merely an overgrown specimen of the average local dental society, from which type of association it differed but little except in point of size and geographical distribution of membership.

The evolution of conditions leading to the nationalizing in a larger sense of the National Dental Association is the distinct result of growth along all dental professional lines everywhere. Increase in the general data of dentistry and the growing tendency toward specialization have compelled a change in the whole method of organization and conduct of dental meetings of the larger and more representative class. The stress of this developmental movement has been felt within and without our National Association for a long period, and has been the compelling force leading to the final adoption of the reorganization scheme.

It is scarcely safe to attempt to predict the results that may be expected to flow from the conduct of the association's affairs under the new constitution, but certain it is that at least one fundamental improvement has been made, and that is the enlarged emphasis that is given to the national factor in the new constitution, whereby the association is not merely reorganized, but what is of greater importance, it is "re-nationalized." It has been for long a discreditable fact that so meager a percentage of the dental profession of the United States are members of any dental society. The reorganization plan, it is hoped, will do much to stimulate the membership growth of all dental societies in this country, and thus make the association a powerful influence in dental education among those who for various reasons or no valid reason have let the habit of neglect bring about a condition of atrophic degeneration in their centers of dental professional education.

It is to be hoped that among the by-laws that must be created in time under the new constitution will be one providing for an efficient Essay Committee, whose duty shall be to pass judgment upon the character of essays assigned to a place upon the annual program. It is conceded that the duties of such a committee would be an arduous and generally speaking a thankless task, but such a safeguard is clearly needed, so that elementary discussions of matters that are well understood by the second-year classes of our dental schools shall not be served up as advanced mental pabulum at the meetings of our representative national body. Several instances of these irritating and time-consuming essays could well have been eliminated and more time devoted to more important subjects. An Essay Committee with good judgment, tact, and firmness should be secured to act as editorial censor to protect the annual program from defects of that character, for such censorship is a *sine qua non* for the ultimately successful conduct of the association's proposed official journal as well as a safeguard against destruction of membership interest in the features of the program.

It is cause for congratulation as well as an earnest of better things to come that the association has passed into a new era of useful activity under its more comprehensive charter, which will enable it to grow in membership and in efficiency in better relation to the enlarged field of dental activities than it was at all possible to do under the limitations of the old scheme of organization.

WE regret to announce the death of Dr. J. P. ROOT of Kansas City, Mo. (on September 4th); also of Dr. CHAS. S. STOCKTON of Newark, N. J. (on September 9th). Obituary notices will appear subsequently.

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LOCAL ANESTHESIA IN DENTISTRY, WITH SPECIAL REFERENCE TO THE MUCOUS AND CONDUCTIVE METHODS. A Concise Guide for Dentists, Surgeons, and Students. By Prof. Dr. GUIDO FISCHER, Director of the Royal Dental Institute of the University of Marburg. Translated from the second German edition, by RICHARD H. RIETHMUELLER, Ph.D. (Univ.Pa.), Dental Department of the Medico-Chirurgical College, Philadelphia. Illustrated with 105 engravings, mostly colored. Pp. 202. Price $4.00 net. Philadelphia and New York: Lea & Febiger, 1912.

The systematic study of means and methods for the elimination of pain during surgical operations has always been the aim of those interested in the cure of bodily ills. With the introduction of nitrous oxid as a general anesthetic in 1844 by Horace Wells, the once famous remark of Velpeau (1832)—that "To escape pain in surgical operations is a chimera which we are not permitted to look for in our time"—lost its significance.

Although remarkable results are achieved with general anesthesia, there is, nevertheless, a certain element of danger present in its universal application, which stamps it as an undesirable agent in minor operations. With the discovery of cocain and its introduction as a local anesthetic by Koller in 1884, surgical therapeutics achieved results which were beyond expectations. The recent developments in rhinology, laryngology, and, to a large extent, operative dentistry, are directly dependent on the fact of producing insensibility to pain in localized areas of tissue. The classic researches of Braun and his co-workers have greatly popularized the application of local anesthesia, and it was but a step to apply the same procedures in the special domain of the dental surgeon. The volume before us portrays the most recent views of the praxis of local anesthesia in dentistry.

Fischer has divided the subject-matter into three parts. After a brief historical review, the reader is made acquainted with the various agents used as local anesthetics, including their physical properties, therapeutic effects, toxicology, etc. The author has rightly eliminated cocain and all other substitutes, in favor of novocain, and furnishes plausible reasons for doing so. The instrumentarium and the disinfection of the field of operation are thoroughly considered. Regarding the anesthetic solution as employed by Fischer, a so-called normal solution is advocated, containing novocain, sodium chlorid, thymol, and distilled water, to which definite quantities of synthetic suprarenin are added at the time when used. The admixture of thymol, even in minute quantities, which he so highly lauds, is useless. This opinion is shared at this moment by all—including Fischer—who have given the subject considerable thought. In the past, Fischer has also been opposed to the use of ready-made tablets containing the various ingredients necessary for making the anesthetic solution. The extensive employment of these tablets—on account of the extreme simplicity of preparing a fresh sterile solution extemporaneously in a few moments, including bacteriologic tests—is conclusive proof of their usefulness, and in consequence thereof Fischer has been forced to withdraw his anathema.

The Second part of the book is principally concerned with the indications for local anesthesia, including its dangers, the operator's responsibility, and a consideration of anesthesia in the therapy of inflammation.

The Third part of the book will probably prove to be of the greatest interest to the average reader. It deals with the technique of local anesthesia. The minute structure of the maxillary bones, their histology and nerve supply as related to local anesthesia, are described in detail. The value of the descriptive matter is materially enhanced by a very large number of excellent illustrations, partially in black-and-white and partially in colors. The logical conclusions drawn from these anatomical descriptions are utilized in the detailed application of the technique of injection. Aside from the various routine methods of injection, Fischer emphasizes most strongly what is known as conductive anesthesia—viz, injection in the vicinity of the large nerve trunks. While this method is principally applicable for specific surgical purposes and for wholesale extractions, we are quite certain it will never become very popular in the United States. We personally believe that in the great majority of cases as they present themselves in a routine praxis, the peridental injection and the rhomboid injection according to Hackenbruch are the most satisfactory methods of producing quick and gratifying results.

Various tables and other condensed information regarding the subject under consideration conclude this interesting volume.

Dr. Fischer's book is deserving of high praise; he has dealt with the subject in a masterly manner. Our profession is under lasting obligation to Dr. Riethmueller for having rendered this book so ably into English. It is not merely a verbatim translation, but rather a narration of the subject-matter in easy-flowing language which makes its perusal a pleasure.

The technical execution of the book by Messrs. Lea & Febiger has been accomplished in a most satisfactory manner; they are to be congratulated from the viewpoint of the booklover.

Hermann Prinz.

Stomatology in General Practice. By H. P. Pickerill, M.D., Ch.B., M.D.S. (Birm.), L.D.S. (Eng.), Hon. Stomatologist General Hospital, Dunedin; Professor of Dentistry and Director Dental School, University of Otago, N. Z. Pp. 268, with 65 illustrations. London: Henry Frowde; Hodder & Stoughton, 1912.

This book is written especially as a guide to the general medical practitioner in the somewhat ill-defined field now coming to be recognized under the name of Stomatology. At the same time it contains matter worthy of the consideration of the dentist and specialist in this field of work. The leading chapters of the book in turn deal with deformities of the teeth and jaws, inflammatory conditions of the mouth, dental arthritis, the preventive treatment of dental caries, extraction of teeth, fractures of the jaws, closure of the jaws, oral tumors, the manifestation of systemic diseases within the mouth, oral sepsis and its effects, the relationship of oral disease to various lesions of the nervous system, local and general anesthesia, and a method of examining the mouths of school children.

The writer takes exception to the usual analogy of teeth to hair and nails as dermal appendages, saying that they are more like bones. He bases this view on the fact that the great bulk of the tooth—the dentin—is mesoblastic in origin. He apparently fails to recognize that the skin itself is only in part epithelial, and that its papillary layer is derived from the mesoderm.

There are one or two inaccuracies in the use of terms, such as "alveolus" when alveolar process is meant, and "articulation" instead of occlusion of the teeth.

The author rightly emphasizes the point too often ignored by the orthodontist, that the presence of regulating appliances may interfere with the general nutrition of the child. Just as a famous surgeon has said that "It is better to have a live patient with an appendix than a dead patient without one," so is it better to have a healthy child with crooked teeth than one whose teeth have been straightened at the expense of its general health.

The original method of combining surgical and mechanical means in the treatment of congenital cleft palate seems worthy of trial in this discouraging class of cases.

In the chapter on periostitis and necrosis of the jaws the preponderance of the disease in the lower jaw is attributed to greater vascularity of the upper. Is it not rather due to the fact that gravity favors drainage from the upper jaw, while it causes stagnation of inflammatory products in the case of the lower? The injection of local anesthetics into inflamed tissues by driving the inflammatory products into healthy bone is recognized as a cause of periostitis and necrosis. The proper conservative treatment of these cases is advocated, but syringing with hydrogen dioxid should have been condemned rather than recommended, as it is one of the most frequent causes of death of large portions of the jaw-bones.

The writer's radical operation for pyorrhea alveolaris may be efficient in checking the disease temporarily, but since it does not remove the parts in which the disease originates—the so-called pericemental glands or epithelial cell-rests—it is hard to see how permanent benefit can ensue from such a drastic procedure.

The chapters on the prevention of dental caries shed a great deal of new light on the subject, and are an epitome of extensive original researches that have done much toward the solution of this important problem. The author rightly points out the necessity of a knowledge of this subject by the general practitioner, as he, rather than the dentist, has care of the child at the important age of eruption of the teeth. There are useful chapters giving methods of temporary treatment of lesions of the teeth within the powers of the general practitioner in cases of emergency.

Under treatment of fractures of the jaws, considerable space is devoted to descriptions of various obsolete interdental splints, while nothing is said of the most modern of these appliances, viz, the mandibulo-maxillary metal splint, which gives absolute fixation of the fragments while maintaining the teeth in correct occlusion. He says splints are useless for fractures behind the last molar tooth because they do not fix the posterior fragment, and then introduces a method of treating such fractures, by passing wires around the teeth, which obviously does not fix the posterior fragment any more than a splint. It is difficult to see how this intermaxillary lacing by wire can be efficient for the great majority of fracture cases, in which the teeth as a rule are poor and few in number.

The manifestations of systemic diseases within the mouth and the effects of oral sepsis are well discussed. Full consideration is given to reflex nervous affections arising from lesions of the teeth and jaws.

The author betrays ignorance of ether as an anesthetic when he gives as one of its disadvantages the fact that it requires special apparatus for its administration. There is no mention of the use of nitrous oxid and oxygen for prolonged anesthesia.

In appendices are found a method of recording examination of the teeth of school children, formulæ useful in oral conditions, and a list of simple dental instruments suitable for a general practitioner.

The book should be useful as an aid to general practitioners in coping with problems of almost everyday practice, and should serve to emphasize the necessity for adequate instruction on oral conditions being given in medical schools.

R. H. I.

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REVIEW OF CURRENT DENTAL LITERATURE.

[*Zeitschrift fuer Zahnaerztliche Orthopaedie,* Berlin, March 1912.]

LIGATURES IN ORTHODONTIA. BY P. J. J. COEBERGH, UTRECHT.

Referring to a paper by F. Carls, Hamburg, on "A By-effect of Ligatures," and one by R. Langendorff, Vienna, on "A Contribution to the Rotation of Ligated Teeth," which were published in the October and December 1911 issues of *Zeitschrift fuer Zahnaerztliche Orthopaedie,* and reviewed in the DENTAL COSMOS for May 1912, p. 614, Coebergh indorses Carls' findings, and contributes the following suggestions: When we fix a simple ligature, the whole tooth is tilted. The crown moves toward the side where the ligature is nearest to the root, viz, in the maxilla under, in the mandible above the expansion arch. Especially when the tooth is lying against the arch is the apex of the root tilted. This tendency can be obviated in many ways. If the teeth are very crowded, it is best to fasten the ligatures as in Fig. 1. When lateral expansion has brought the teeth into alignment, it is well to apply the ligature as shown in Fig. 2, in order to insure the correct level of the incisal edges. This is followed by a continuous ligature or by one of the type shown in Fig. 3. In cases of class II (Angle's classification), it often occurs that the four lower incisors are arranged fan-like behind the canines, as in Fig. 1, the crowns inclining distally, the roots mesially. If the teeth are touching each other on the approximal side near the incisal edge, and are lying against the expansion arch, the whole force of the ligatures is exerted upon the roots. If the operator does not wish to tilt the teeth either distally or mesially, but would bring them toward the arch or fix them thereto, a continuous ligature is used. For fixing a single tooth, the writer always uses the ligature shown in Fig. 3, which exerts no by-effect. Landsberger's ligature, as described in the paper above-mentioned, and Frank's ligature, as illustrated in Figs. 4 and 5, do have secondary action, which, however, is sometimes of the greatest value, especially if the ligature is fastened rootward, which constitutes the simplest method of moving the roots of the

FIG. 1.

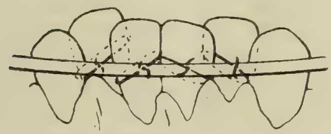


FIG. 2.

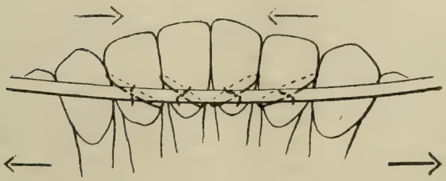
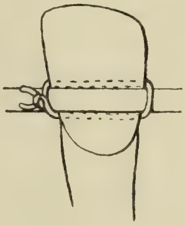


FIG. 3.



teeth. This ligature can be tied in the reverse way indicated in Figs. 6 and 7, and with the effect indicated by the arrows.

FIG. 4.

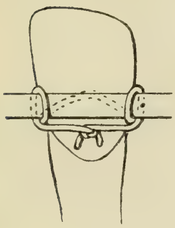
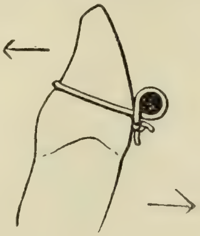


FIG. 5.



A simpler and expeditious method of moving the roots of single teeth consists in banding the tooth and soldering to the band labially above and below the expansion arch a wire of 1.3 mm. thickness and protruding two or three mm. from the band on either side, as shown in Fig. 8, the free ends of the wires to be fastened to the expansion arch by silk ligatures. This method applies to incisors, canines, and bicuspids.

FIG. 6.

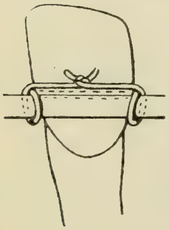


FIG. 7.

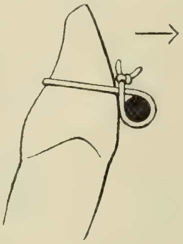
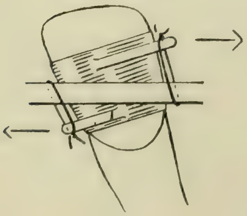


FIG. 8.



[*Journal of the American Medical Association*, Chicago, May 4, 1912.]

GAS-OXYGEN ANESTHESIA. OBSERVATION IN 2000 CASES. By DR. E. M. PRINCE, BIRMINGHAM, ALA.

The writer bases his observations on over 2000 operations performed under gas-oxygen anesthesia, most of them major surgical operations, and makes a few comments which are of interest to the dental practitioner who is using nitrous oxid and oxygen anesthesia in his daily practice.

Thorough training in the administration of this anesthetic is a prerequisite. The patient's weight is no contra-indication, Prince having administered nitrous oxid and oxygen to three men weighing over 225 pounds, with better success than if ether had been employed. He does not hesitate to use this anesthetic in heart lesions, as the rise in blood-pressure is inconsiderable when plenty of oxygen is given. In lesions of the lungs and kidneys, no one can question the superiority of gas-oxygen anesthesia over other methods. The patient of dark-skinned race requires most careful watching, for one of the most important signals is lacking, viz, the change of color, which should always be a little less than pink. The anesthetist is governed in such cases by the pulse-rate and respiration as to the amount of oxygen to be administered. The inveterate drinker and the morphin *habitué* are very undesirable patients for an anesthetic of any kind, but no more so for gas-oxygen than for other anesthetics. In this class of cases the use of scopolamin plays a very important part. For the administration of the anesthetic, the writer uses the Cunningham apparatus, from which the ether-chamber should be left off.

If complications arise, respiration is the main factor to be watched, and if it is suspended in any case, a punch over the stomach will suffice. Carbon dioxid can be given if desired. The pulse-rate is altered very little by nitrous oxid and oxygen, and can be regulated by the administration of proper quantities of oxygen. The urine excreted after gas-oxygen is greater in quantity than after ether; it is always free from albumin, which is not the case after ether. The patients awaken in a few minutes and are better able to care for themselves, and vomiting is very infrequent.

As to rebreathing, the author condemns the consideration of cheapness when the patient's welfare is at stake. The argument advanced by the advocates of rebreathing regarding the value of carbon dioxid as a respiratory stimulant is weak, since such a stimulant is rarely needed, and, if so, is certainly wanted at once. Since the exhaled breath is composed of only 4 per cent. carbon dioxid, it would require quite a number of breaths to obtain the stimulating action of carbon dioxid desired—and at the same time the patient is breathing the other waste products of expiration. It would be logical, therefore, to have a tank of carbon dioxid in the pure state attached to the machine where it is always ready for use in an emergency. Moreover, few advocates of rebreathing would enjoy breathing from the same bag as a tuberculous patient, and these bags cannot be boiled, which would be practically the only way of sterilizing them.

[*Archiv fuer Zahnheilkunde*, Dresden, August 1912.]

DEVITALIZATION AND ROOT-CANAL TREATMENT. By Dr. J. M. Berkowitz, Berlin.

Pain and failures following the insertion of arsenous oxid in a cavity for the devitalization of a pulp are attributed by the writer to the faulty application of the devitalizing paste or the temporary filling. The pain or uneasiness is, as a rule, not of very long duration, viz, from one-half to three and one-half hours; in nervous patients, however, and in women during menstruation, the pain may be excruciating, and the patient will therefore often seek relief in another dentist's office. The author prepares his devitalizing paste freshly for each case, by mixing a large drop of carbolic acid with sufficient cocain to make a paste, to which he adds finely pulverized arsenous trioxid. A pellet of cotton is dipped into this paste, moistened, and placed directly over the pulp without applying pressure. The cement for sealing-in the devitalizing paste should be mixed before the arsenic is applied to the cavity. A cheap soft cement, of the Fletcher type, is employed, which is convenient to remove at the next sitting. In order to give this temporary filling a good hold and prevent leakage of the arsenic, the weak or overhanging enamel walls should not be broken away until after the devitalization of the tooth. After forty-eight hours, the arsenic dressing is carefully removed, the pulp-chamber opened, and another treatment applied in the pulp-chamber, composed of equal parts of cocain, thymol, and creasote. This combination, if freshly prepared, is most useful in making painless extirpation possible. With a broach sterilized by dipping in carbolic acid and dressed with cocain solution, the pulp can be removed entirely without discomfort to the patient. The empty root-canals are treated with tricresol-formalin.

[*British Dental Journal*, London, June 15, 1912.]

FIVE TYPES OF DIFFICULT EXTRACTION, AND HOW THEY MAY BE OVERCOME. By F. Coleman.

I. SMALL PORTIONS OF LOWER BICUSPID ROOTS.

Small portions of lower bicuspids often give rise to much difficulty in their removal, and the difficulty is increased if the following conditions be present: (*a*) Dense bone surrounding the root. (*b*) Curvature of the end of the root. (*c*) Exostosis of the end of the root. (*d*) Softness of the root itself.

In order to remove portions of roots that are situated deep in the alveolus, we must first recognize that this can usually only be accomplished at the expense of injuring the surrounding bone. The ordinary forms of root-forceps become "locked" in the socket before the blades reach the root, or the socket prevents the blades being opened sufficiently wide to clear the margins of the root and obtain a firm grasp of it.

The following methods are available:

(1) To use a specially designed instrument, the blades of which are long and slender and meet at their points, and with a nozzle that is diminished in width. By means of this instrument the blades are capable of being passed deep into the socket, and can sometimes be opened sufficiently wide to grasp the root.

(2) To open the blades of the forceps suf-

ficiently wide to clear both sides of the alveolus and to force the instrument to below the level of the root before closing the blades.

(3) To pack firmly the socket with gauze, so that the remains of the tooth can be detected on a subsequent visit. The objections to this method are that the wound is likely to become septic and consequently painful, and that even if a view of the root be obtained, it may still be necessary to resort to one of the above methods for its removal.

(4) To thrust a straight elevator through the outer alveolar wall inward toward the apex of the root, and by depressing the handle of the elevator to raise the root up to the surface of the socket.

This method has been found extremely useful on the few occasions that it has been employed. The method is easier if there be a sinus on the gum, which forms a guide to the apex of the root and indicates rarefaction, or softening of the bone along the tract in which the instrument is applied.

II. LOWER THIRD MOLARS CARIOUS OR BROKEN BELOW THE SURFACE OF THE ALVEOLUS.

These extractions are rendered more difficult if the following conditions be present: Impaction of the root, dense bone surrounding the root, curvature of the root, or exostosis of the root.

Root-forceps may fail for the same reason as mentioned above, viz, the socket offers such firm resistance that sufficient opening of the blades is rendered impossible; in addition, the tooth is so far back in the mouth that it may be difficult to apply the instrument in its axis. Curved root-forceps (hawk's-bill) will sometimes obviate the latter difficulty. The straight elevator is unavailable under these circumstances, as the root is too low down to obtain any purchase on it. The method available, then, is the "right-angled" elevator.

This is an instrument devised by the writer for this condition. The blade is wedge-shaped and set almost at a right angle to the shaft. The instrument is applied to the front wall of the tooth and forced as low down on the root as possible, and the tooth loosened by rotatory movements—*i.e.* supination and pronation. The effect of this instrument is rather to displace the root backward than to actually raise it, but this has the effect of dilating its socket and rendering its subsequent extraction less difficult.

Should the above method fail, no set operation can be suggested for this condition, and it is usually by employing a combination of instruments and methods and finding out the weak spot that the root is eventually loosened and removed.

The bone in the region of the lower third molar is too thick to be perforated by a straight elevator and the root raised, as in dealing with a lower bicuspid root.

III. HOLLOW UPPER FIRST MOLARS.

The difficulty that may be encountered in removing these teeth lies chiefly in the want of a suitably designed instrument. Upper Read forceps often fail in these cases because their handles must be so far separated for the blades to inclose the remains of the tooth crown that control over the instrument in carrying out the extraction movements is greatly hindered. The blades of the instrument are also too slender to obtain a firm grasp on the tooth.

Upper bayonet forceps allow of wider separation of the beaks with corresponding less divergence of the handles, but owing to the increased distance from the tip of the beaks to the joint, some power is lost, as well as impairment of the sense of touch.

Instruments have been devised for meeting this condition. In one form the palatal blade is bifid for grasping the palatal root (Stevens). This form of instrument has not met with much favor; the bifid blade is rather weak and liable to break. In another form the outer or buccal blade tapers to a point for passing between the buccal roots (Baly). The principle of this latter instrument is better than the former, and should it fail to remove the tooth intact it will have the effect of dividing its roots much in the same way as dividing-forceps, which are also sometimes useful in these cases.

The writer has recently had an instrument made to overcome the wide separation of handles that is necessary in using the present forms of root-forceps on a broad root. The blades are broader than those of the Read forceps, they do not quite meet at their tips, and their handles lie in contact, so that greater separation of the blades can be obtained with correspondingly less divergence of the handles.

IV. HOLLOW UPPER INCISOR ROOTS.

To remove teeth from their sockets the latter must be dilated, unless the tooth be loose or conical and tapering. This dilatation is obtained by movements applied to the tooth. The type of tooth under discussion is so frail that it would not permit of being used as a dilating force, consequently some other method must be employed for dilating or opening up its socket.

That this type of tooth has given rise to difficulty in its removal is again apparent by the many devices employed, *e.g.* temporarily filling the root or using an instrument known as the screw forceps. Temporarily filling a root produces only a false solidity, and a root sufficiently strong to withstand the internal strain of the screw forceps would with less risk withstand the external strain of root-forceps if intelligently used.

The following methods may be employed:

(1) The root may be trenched or trephined by pressing the blades of fine root-forceps up to the apex of the root, avoiding any pressure on the root by having the blades of the forceps opened sufficiently wide. After a gutter or trench has been made around the root, the latter may be lightly and cautiously grasped and allowed to fall out almost by its own weight.

(2) If the root breaks up, even under these precautions, the method of raising the apex of the root by an elevator passed through the alveolus may also be applied to these teeth.

V. PALATAL ROOT OF UPPER FIRST MOLARS.

This is usually the most difficult of the molar roots to localize when carious or fractured below the gum, and its subsequent extraction is consequently more troublesome.

An empty buccal socket forms a guide to its outer margin, but owing to its obliquity, the inner margin of the root cannot easily be detected. Upper Read or curved root-forceps are apt to slip off the inner margin of the root into the center of the socket. A pair of upper narrow incisor forceps is often the best instrument for the removal of this root, the axis of the root being easily obtained with this form of instrument, and there not being the same tendency for the blades to slip to the middle of the socket.

[*New York Medical Journal*, New York, July 13, 1912.]

INDICATIONS FOR REMOVAL OF THE FAUCIAL TONSILS. BY DR. H. HAYS, NEW YORK.

After studies comprising a series of some 300 cases, in which, on examination, a number of points were taken into consideration, namely, the size of the tonsil, whether it was diseased, its relation to the rest of the throat, and its association with other local or general conditions, Hays comes to the following conclusions:

The tonsil has a definite function in early childhood, the general tendency of today being toward the belief that, in infancy and early childhood, the tonsils play a very important rôle in warding off various infections. Tonsils, therefore, should not be removed, unless there is some special indication, before four years of age. Small buried tonsils associated with enlarged cervical glands should always be completely removed, unless some other definite cause is found for the condition. Tuberculosis is often found to be of tonsillar origin. One of the most important points to be considered in judging whether a tonsil should be removed or not is the size of that tonsil in relation to the individual throat. All tonsils, large or small, which seriously interfere with respiration should be removed. The most important local diseases and conditions in which the tonsils play an important rôle are as follows: Mouth-breathing, high-arched palate, decayed teeth, and a number of others which are of minor interest to the dentist. In many cases of mouth-breathing, the removal of adenoids does not relieve the condition. When the tonsils are unusually large, or when the child's throat is unusually small, or when the naso-pharynx is narrow and shallow, the effect of the projection of the tonsil into the naso-pharynx may seriously interfere with nasal respiration. Tonsils causing such a condition must be removed. In the class of cases, however, that present the high-arched palate symptom-complex, even the most thorough cleaning-out of the throat will not bring about wide enough nasal orifices to allow proper breathing. Such children need the services of the orthodontist, who, by spreading the upper jaw, is able to bring about remarkable results, in some instances widening the floor of the nose as much as three-quarters of an inch.

The relation of the tonsils to carious teeth is a far more important one than is generally supposed, the tonsils affecting the teeth in three ways: First, by impairing general nutrition, second, by contributing very largely to the local invasion of the teeth by the numerous bacteria that invade their crypts, third, by their pressure interfering with the alignment of the teeth and with the normal development of the maxillary bone. The constant play of infectious matter around the sockets of the teeth may also be of great importance. However, the possible pressure of enlarged and solid tonsils on the unerupted teeth means a great deal, for by such pressure on the alveolar processes the jaw may likely be foreshortened and a deformed palate result. Such a state of affairs affects the entire system of the child, meaning blood impoverishment and the usual attendant symptoms.

Many cases of middle-ear catarrh could be prevented by removal of the tonsils. There is also a distinct relationship between the tonsils and many general diseases. The promiscuous removal of the tonsils of children without the finding of some associated pathological condition is pernicious, and all cases demanding operative interference should be carefully selected.

[*Deutsche Monatsschrift fuer Zahnheilkunde*, Berlin, July 1912.]

MODERN PRINCIPLES IN THE TREATMENT OF EMPYEMA OF THE ANTRUM OF HIGHMORE. By Professor Williger.

After citing a great many practical cases and giving interesting details of the methods of treatment adopted, the writer advances the following postulates: A permanent communication between the oral cavity and the maxillary antrum is to be avoided, if possible. Any such communication, therefore, which has been established either on purpose or accidentally in extractions, must be stimulated to form healthy granulations and to heal up. Simple inflammations of the antrum should be treated by conservative measures. Sprays are best applied through the nose. In empyema of absolutely certain dental origin, the extraction of the culprit tooth is indicated. The establishment of a permanent opening through the alveolus of a tooth and the permanent carrying of an antrum-plug are to be condemned, as a rule. In operative treatment of chronic empyema, the radical operation of Caldwell-Luc yields the most satisfactory results.

[*Le Laboratoire et le Progrès Dentaire*, Paris, August 4, 1912.]

SUPPORT FOR A REMOVABLE SADDLE BRIDGE WITH ONE ABUTMENT, IN CASE OF LACK OF A POSTERIOR ABUTMENT. By J. Cournand.

The writer describes the prosthetic appliance devised for a case in which the lower molars are to be supplied. The second bicuspid is ground down, without necessarily being devitalized, and fitted with a gold cap to which two half-round wires of No. 24 gage are soldered, separated from each other by from two to three millimeters and resting on the gingival ridge, and united by a crosspiece at their posterior ends. In the center of the places which are to be occupied by the artificial molars two parallel pivots are soldered to the wire bar at an angle corresponding anatomically to the long axis of the remaining natural teeth, and inclining buccolingually. This support is mounted on the model, and a fairly large saddle is modeled over it in wax. The metal pivots of the support are covered with metal tubes, and molar bridge teeth are fitted over both. After removing the molar teeth and tubes, the saddle is cast in metal. The tubes are soldered to this saddle, and the molars cemented on the same. The obliqueness of the pivots bucco-lingually allows of easy removal of the saddle part of the bridge by slight traction on the first bridge tooth with thumb and index finger in the bucco-lingual direction without danger of loosening the support. This support may be anchored to an inlay with a post instead of a shell crown.

PERISCOPE.

Removing Hardened Silicate or Other Cement from a Roughened Glass Slab.—A little hydrochloric acid poured on the slab will loosen the cement, and it can then be brushed off with ease.—*Ash's Monthly.*

Making Iron Rust-proof.—The Coslettizing process for producing a rust-proof finish on iron consists in boiling the article in a solution of 10 oz. of iron filings in 40 oz. of phosphoric acid and one gallon of water. The coating produced is black.—*Chem. Trade Journ.*, per *British Dental Journal.*

Alexander's Wax Gold for Repairing Gold Work.—If a piece of gold work that has sustained a loss by cutting or wear is to be repaired, a piece of Alexander's wax gold is burnished into the deficient portion, and flowed with solder. A two-piece crown or an appliance with facings should be invested, while a seamless crown can be held directly in the flame.—C. E. ALLEN, *Dental Review.*

Repairing Broken Cables.—If a cable engine is used in the surgery or laboratory, the cable—which is sure to break sooner or later—should not be thrown away. It can be repaired by placing a duplex spring over the broken ends, and attaching with soft solder. This repair requires but a few minutes, and the cable will render as good service as before.—W. V. WILKINSON, *Commonwealth Dental Review.*

Method of Filling a Cavity at the Bifurcation of a Root.—In cases where the gum has been denuded so far on the side of a tooth as to expose the roots below the bifurcation, thus allowing particles of food to work in and set up an inflammation that will eventually loosen and destroy the tooth, the following remedy gives happy results: If there is already a cavity cut through the bifurcation, a thin piece of lead is burnished into it, with a stirrup extending out and resting on the gum, in fact pressing into the gum with considerable force. The cavity can then be filled with amalgam, and an almost useless or loose tooth restored and made serviceable.—G. S. STAPLES, *Dental Brief.*

Vulcanite Dentures.—In the event of the base rubber showing through the pink at any spot after the case is vulcanized, the defect can easily be remedied by drilling out the base rubber with a rose-head bur, and making the interior of the cavity larger than the opening. When this has been done, a small piece of the vulcanized pink rubber is cut from the distal end of the denture, warmed over a spirit lamp, pressed into the undercut cavity, filed up, and polished. If the work is done neatly, no joint will be visible.—*Ash's Monthly.*

Closure of Cleft Palate by Pressure.—Shea traces this operation back to 1776, when Lemonier, a French dentist, performed it. There have been many methods introduced since then, but Shea has a new method in which he uses a bar made of gold and platinum wire, No. 18 gage. It has threaded ends with nuts attached thereto, and by being screwed up a little each day, they close the cleft by constant and gradual pressure, all soft parts of the mouth being thoroughly protected by gutta-percha.—*Internat. Journ. of Surgery*, per *N. Y. Med. Journal.*

Cocain Habit Acquired After Dental Treatment.—Dr. James A. Colton, dental inspector of the public schools in Providence, R. I., points out that the use of anesthetics for the relief of pain may lead to serious results; reporting as follows:

I desire to call attention to three cases which have come under my observation quite recently. Three boys of grammar-school age have become pronounced cocain victims from the employment of this drug, which was first used, according to their story, to relieve the suffering resulting from dental disease.—*British Journal of Dental Science.*

Decolorizing the Iodin Stain.—H. Chabanier and E. Chabanier state that decolorization is important, not only for the sake of the operator, but because the tincture of iodin, after being allowed to remain in contact for a few minutes with the site of operation, may be rendered colorless without prejudice to its antisepticizing properties.

Sodium hyposulfite is the decolorizing agent preferred, made with sterile warm water in ten per cent. strength. Another important point is that, if the operator violates his aseptic technique, he may restore asepsis by immersion of the hands in tincture of iodin mixed with an equal part of alcohol, and a subsequent dipping in the hyposulfite solution. The hands are then both surgically and esthetically clean.—*Presse Médicale,* per *N. Y. Med. Journ.*

Flasking a Vulcanite Denture.—The case is flasked and immediately placed over a burner at very low heat for from one to two hours, depending on the amount of wax used in setting up the plate. The flask is then opened, when the wax will have disappeared. The space is rinsed out three or four times with chloroform and the rubber is packed and vulcanized, allowing one hour to raise the heat to 290° and maintaining it at that temperature for two and one-half hours. This method involves less trouble, requires less attention, and produces a firmer texture of rubber.—T. Houston, *Texas Dental Journal.*

Salvarsan Reaction on Teeth.—Zimmern has taken into consideration the observation of Neisser, who stated that many patients noted severe pain in their teeth after salvarsan reaction, an observation which was also made by E. Hoffmann. Zimmern has noticed the same condition in patients with severe stomatitis, whose teeth were in a carious condition. The pain usually disappeared in about two hours. Zimmern believes that this toothache is to be attributed to the fact that spirochetes of the teeth and mouth are destroyed, and toxins are liberated under the spirillocide influence of salvarsan. He has not been able to verify this theory under the microscope, where the spirochetes were not less active after an injection.—*Berliner Klinische Wochenschrift,* per *N. Y. Med. Journal.*

Arrangement for Sterilization of the Operator's Hands.—The first step in any dental operation should be the preparation of the operator's hands. It is not allowable for him to go from one patient to another without thoroughly washing his hands, and it is not sufficient simply to wash with water. Soap should be generously used. A faucet of flowing warm water should be arranged, which is operated by stepping on a little button protruding through the floor. Three objects are gained by this: The hands are washed and rinsed by flowing water, which is preferable to a bowl of water; they do not touch a faucet handle, and they are warmed. A dentist should not touch a patient's face with cold hands. The tincture of green soap serves not only as a soap, but is one of the best sterilizing agents for the hands.—L. E. Custer, *Dental Summary.*

Diagnosis of Diseases of the Pulp by the Electric Current.—The action of the electric current on a sound or normal tooth expresses itself in a definite sensation, such as a tingling, if the correct strength of current is used, which is determined by the resistance of electric stimulation in each individual case. The inflamed or irritated pulp responds more readily to the electric current than does the normal pulp, the irritation from the current increasing in direct proportion to the amount of inflammation present. The inflamed pulp, with pus micro-organisms present, responds to the electric current less readily than does the normal pulp. The dead pulp does not respond at all to electric stimulation.

The electric current is a valuable aid in establishing a definite diagnosis in many otherwise difficult cases.—I. M. Saum, *Dental Summary.*

Ulcerous Lesions of the Tongue.—Evans found that cancer of the tongue is of frequent occurrence in males over the age of 40 who may be addicted to alcohol or tobacco, who frequently partake of irritating condiments, or who practice any of the different habits of "chewing." He says that any long-continued wart, hard lump, or unhealed ulcer on the tongue or gums is liable to become the seat of cancer. Close attention to the cleanliness of the mouth and the brushing of the teeth is advisable. There is no more frequent precursor or accompaniment of cancer of the tongue than syphilis. Any carious tooth, any roughness of the teeth or of a denture, demands a visit to the dentist, whereas, for any soreness, early medical advice should be sought, as such alone leads to the early recognition of cancer and is the keynote to success.—*Brit. Med. Journal,* per *Journ. of Amer. Med. Association.*

Present Condition of Treatment of Root=canals.—As we cannot obtain perfect sterilization of root-canals, owing to the anatomical conditions, we must attempt to insert a filling material which will act as a permanent disinfectant. Therefore such volatile agents as alcohol, formalin, creasote, carbolic acid, tricresol, and balsam of Peru produce but temporary results.

An ideal combination would be a mixture

of a strong volatile agent with a permanent insoluble or partly soluble body, which may only change at a later time chemically. As such might be considered the metallic disinfectants, such as colloidal silver, colloidal gold or platinum, calomel, which would form traces of $HgCl_2$, and metallic Hg through $CaCl_2$ after some time. In case of anaerobic fermentation, $HgCl_2 + Hg$ might be reduced again to Hg_2Cl_2 (calomel).

Thus we are still looking for a *permanent* disinfectant as a filling material for root-canals, and there is every hope that the time will come when someone may be able to combine such a body.—J. A. VUILLEUMIER, *Items of Interest.*

Hollow Dowels for Crowns and Bridges.—No. 30-gage, 22-karat gold plate is cut to cone shape and rolled around the shank of an instrument. The ends are brought together and fluxed, and a small piece of solder is placed inside to close up the seam. The dowel should be long enough to fit the canal, and to allow of cutting off at either end, according to the length and width of the canal. After the hollow dowel has been fitted to the canal, a band and cap is fitted to the root. The dowel is put in place, leaving it long enough to be filled up with solder when being soldered to the cap. Or a small wooden plug should be placed in the upper portion of the dowel before taking the impression, filling the hollow dowel in the final soldering. This dowel can be used in cast-base Davis crowns. A V-shaped groove is cut in it, which will allow the solder to fill it up during the casting. Wax is placed on the end to prevent the investment from filling up the top portion. This dowel can also be used in restoring molars with large inlays. Its advantages are that it is very strong and inexpensive, and adapts itself perfectly to the root-canal.—R. H. DANIELS, *Dental Brief.*

Treatment of Leucoplakia.—Aviérinos states that in conjunction with hygienic measures—*i.e.* elimination of all causes of local irritation, chemical or mechanical—and with constitutional treatment, he has obtained excellent results by local application of the following solution:

℞—Cupri sulfatis,	2 gm.
Aquæ destillatæ,	
Glycerini,	āā 10 gm.
M. et ft. solutio.	

The buccal mucous membrane is first well dried, and the patches of leucoplakia are treated with the solution, which is applied with cotton. An application is made every morning, after washing out the mouth, for twenty successive days. Ten days of rest are then allowed to pass, after which the treatment is resumed. At first the solution may be diluted one-half, in order to test the sensitiveness of the patient's mucous membrane, irritation of which is to be particularly avoided. The copper sulfate solution was found by the author to be far superior to the solutions of salicylic acid, potassium bichromate, chromic acid, mercury salts, etc., hitherto used.—*Quinzaine Thérapeutique,* per *N. Y. Med. Journal.*

Painless Excavation of a Hypersensitive Tooth Affected with Pericementitis, by the Application of Cement.—The painful tooth, with the two approximating teeth, mesially and distally, as well as the gingivæ, are thoroughly dried with cotton and hot air, and thinly mixed cement is applied rather thickly upon the lingual and buccal surfaces of the three teeth, also the gingivæ, the cement to be carried into the interproximal spaces. The masticating surfaces of the sound teeth may also be covered, leaving only the masticating surface of the diseased tooth free of cement. The cement is then allowed to harden, the patient being requested to leave the mouth open for from five to ten minutes. After the cement has hardened completely, the diseased tooth can be excavated with new sharp burs under light pressure. The hypersensitive tooth is held firmly in position by the cement, and no pressure is exerted upon the inflamed pericementum and alveolus.

If approximating teeth are missing, the tooth may be surrounded with a layer of cement covering the gingiva, but leaving the masticating surface exposed. After the cement has hardened, the tooth can be opened without pain. By attaching a silk thread around the neck of the tooth, and having the patient or assistant exert a constant, rather strong pull upon the tooth, the pain of opening up a tooth affected with pericementitis can be reduced considerably.—*Deutsche Zahnaerztliche Zeitung.*

Suggestions for Safe Nitrous Oxid and Oxygen Anesthesia.—To produce a prolonged nitrous oxid and oxygen anesthesia, free from muscular spasm and as smooth and tranquil as that produced by any other anesthetic, it is necessary to eliminate cyanosis and all other evidences of asphyxia, a thing more easily said than done. The following suggestions, if followed carefully and technically, will make possible such an anesthesia:

Have a continuous flow of both nitrous oxid and oxygen under positive pressure. Use warm gases, as a more tranquil anesthesia will be induced, and there will be no postoperative bronchitis or pneumonia. Maintain depth and character of anesthesia, not by turning off and on the nitrous oxid, but by regulating the supply of oxygen. Watch the patient closely and learn to anticipate symptoms.

When it is taken into consideration that the patient recovers from this anesthetic immediately, regardless of the time he has been under its influence, that there are no after-effects either upon the lungs or kidneys, that it can be given safely to patients who could not live under ether or chloroform, is it to be wondered at that nitrous oxid and oxygen anesthesia is growing in favor? Scientists are slow to adopt new methods, but it is the opinion of nitrous oxid and oxygen experts that in the near future this form of anesthesia will be given preference in all of our hospitals.—A. HALL, *Dental Summary.*

Protecting the Hands When Working with Photographic Developers.—Dentists who develop their own X-ray plates sometimes suffer with exceedingly persistent skin eruptions of the hands. Rubber gloves, unfortunately, have proved inadequate for such work. The hands should therefore be protected by a very thin film of wax and fat, which can be prepared in the following manner: Of a pure neutral soap 100 gm. are dissolved in 100 cc. of water by heating; to this solution 100 gm. of wax are added under continual stirring, and, after the wax has melted, 10 cc. of concentrated ammonia. After the solution has become clear, 100 gm. of lanolin or a similar neutral fat are added, and if the mass has become too thick, it may be diluted with water to the consistence of honey. The finished preparation is preserved in a stoneware jar. The preparation is applied to the hands in the following manner: After the hands have been cleaned with soap, they are once more lathered with soap, and a small quantity of the preparation of about the size of a hazelnut is rubbed into the hands together with the soap lather, until the skin is completely dry. The hands are then rinsed in water until the slippery sensation has disappeared, and every trace of soap has been washed off. After this the hands should not be wiped with a towel, but the adhering drops of water shaken off. After the developing work is completed, the dressing should be washed from the hands thoroughly, and the skin slightly greased with lanolin.—*Drogenhaendler* per *Zeitschrift fuer Zahnheilkunde.*

Suggestions Regarding Nitrous Oxid Anesthesia.—Snoring after the administration of nitrous oxid for a short period of time, and laryngeal stertor must be carefully discriminated. Patients with thick pendulous uvulæ begin to snore a few seconds after inhalation has commenced. This is also true of patients having postnasal adenoids and enlarged tonsils; also those having loose baggy cheeks. To presume such snoring to be a sign of anesthesia and to operate with no further testimony to the fact that anesthesia has ensued would be committing an egregious blunder. Snoring *per se* is not stertor. True stertor is caused by the vibration of the aryteno-epiglottidean folds, and is more musical. A group of symptoms showing that anesthesia has ensued would be a far safer guide to the anesthetist, and would be more scientific. Patients will snore and yet not be anesthetized. Breathing should be watched very carefully, but if the kind of breathing would indicate anesthesia, and still the conjunctival reflex persists, the return to consciousness will be very rapid. The following changes are to be noted: Duskiness of skin; ears and finger-tips darker; pupils dilated; eyes dull and expressionless; squinting, and, if pure nitrous oxid minus oxygen be administered to children, early jactitation occur, which will often preclude the possibility of an operation. Quivering of the orbicularis palpebrarum warns us that jactitation is about to commence. Oxygen administered with nitrous oxid at this time is advantageous, because the anesthetic qualities of the nitrous oxid progress and the asphyxial symptoms are abolished.—C. F. B. STOWELL, *Dentist's Record.*

Removing Inlay Patterns.—Realizing the difficulties encountered in removing wax inlay models without distortion, and the importance of this part of the operation in attaining perfect results, the writer has adopted the following method and devised a hollow tube with a straight and right-angle end. Each end is fitted with a lock to retain the sprue, which is made of a discarded right-angle bur cut off back of the blades, with a notch cut close to the end, to countersink it in the impression; it is locked with a half-turn in either end of the instrument as indicated by the location of the cavity.

The bulb is filled with cold water by suction, and the attached tubing slipped over the opposite end. The sprue is then held in the flame until hot enough to melt the inlay wax, and then sunk into the impression at a spot best calculated to insure the withdrawal of the same uniformly. The bulb is then pressed gently, forcing a stream of cold water through an opening alongside the sprue, chilling and cementing sprue and wax firmly, thus enabling the operator to draw out the impression parallel with the cavity walls, without the slightest chance of distortion.

By holding the sprue with small pliers and giving the instrument a half-turn, it is unlocked, removed, placed on the cone, and is ready to invest. The sprue will invariably remain in the investment. No attempt to remove it should be made until the case has been sufficiently heated to melt the wax.

The bulb may be held in one hand and the instrument in the other, or between the last two fingers and palm of the hand, and the instrument in the forefingers and thumb. If it is necessary to use both hands, the bulb may be placed in the assistant's or patient's hand, with instructions to press when directed.—W. F. Gary, *Dental Brief*.

SOCIETY NOTES AND ANNOUNCEMENTS.

MONTANA BOARD OF EXAMINERS.

Cancels Reciprocity Contracts.

The Montana State Board of Dental Examiners, at its annual July meeting, canceled its reciprocity contracts with all the states with which Montana had exchange, it being the unanimous opinion of the board that such an exchange was not of any benefit either to Montana or to the states concerned.

R. R. Rathbone, *Judiciary Committee*,
Dillon, Mont.

COLORADO BOARD OF EXAMINERS.

The next regular meeting of the Colorado State Board of Dental Examiners will be held at the Capitol, in Denver, beginning Tuesday, December 3, 1912.

All applications for examination must be filed with the secretary before that date. Examinations are theoretical and practical, and applicants must be prepared to do such practical work as required.

For further particulars, address

J. L. Howell, *Sec'y*,
532 Mack Block, Denver, Colo.

MASSACHUSETTS BOARD OF REGISTRATION.

A meeting of the Massachusetts Board of Registration in Dentistry, for the examination of candidates, will be held in Boston, October 23, 24, and 25, 1912.

For application blanks and further information, apply to

G. E. Mitchell, *Sec'y*,
14 Water st., Haverhill, Mass.

ILLINOIS BOARD OF EXAMINERS.

The semi-annual meeting of the Illinois State Board of Dental Examiners for the examination of applicants for a license to practice dentistry in the state of Illinois will be held at the Northwestern University Dental School, corner Lake and Dearborn sts., Chicago, beginning Monday, November 11, 1912, at 9 A.M.

All applications, together with the fees, twenty-six dollars, must be filed with the secretary at least five days prior to date of examination.

Address all communications to

T. A. Broadbent, *Sec'y*,
708 Venetian Bldg., Chicago, Ill.

NORTHERN ILLINOIS DENTAL SOCIETY.

NOTICE CHANGED DATE OF MEETING.

THE Silver Jubilee of the Northern Illinois Dental Society will be held on the fourth Wednesday and Thursday—23d and 24th—in October 1912, at Rockford, Ill.

A program of unusual interest has been prepared, and a good attendance is desired. A banquet will be served at the expense of the members.

M. R. HARNED, *President*,
Rockford, Ill.

NORTHEASTERN DENTAL ASSOCIATION.

THE eighteenth annual meeting of the Northeastern Dental Association is to be held in the Crawford House, Crawford Notch, N. H., October 1, 2, and 3, 1912. The officers and committees are doing their best to have a rousing good meeting. Please remember the dates and attend.

ANDREW J. SANGER, *President*,
EDGAR O. KINSMAN, *Sec'y*,
Cambridge, Mass.

OHIO STATE DENTAL SOCIETY.

MEETS AT CINCINNATI THIS YEAR.

THE Ohio State Dental Society, which usually meets in Columbus, will hold its annual meeting December 3, 4, and 5, 1912, at Hotel Sinton, Cincinnati. A big meeting is assured.

F. R. CHAPMAN, *Sec'y*,
305 Schultz Bldg., Columbus, Ohio.

PENNSYLVANIA STATE DENTAL SOCIETY.

THE officers of the Pennsylvania State Dental Society for 1912–13 are as follows: C. V. Kratzer, Reading, president; Howard S. Seip, Allentown, first vice-president; James G. Lane, Philadelphia, second vice-president; Luther M. Weaver, 7103 Woodland ave., Philadelphia, recording secretary; George S. Schlegel, 147 N. 8th st., Reading, corresponding secretary; W. A. Spencer, Carbondale, treasurer.

Council—For one year: R. H. D. Swing, Philadelphia; F. D. Gardiner, Philadelphia; C. S. Van Horn, Bloomsburg. For two years: A. E. Bull, Wilkes-Barre; W. C. Scott, Lansford; C. B. Bratt, Pittsburgh. For three years: Victor Cochran, Philadelphia; C. O. Booth, Pittsburgh; C. E. Peters, Pittsburgh.

Board of Censors—D. B. Williams, Wilkes-Barre; C. M. Bordner, Shenandoah; R. J. Seymour, Philadelphia; A. E. Bard, Pittsburgh; King S. Perry, Pittsburgh.

Committees.

Program Committee—A. P. Lee, Philadelphia; A. E. Bull, Wilkes-Barre; F. R. Stathers, Philadelphia.

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Committee on Dental Science and Literature—E. S. Filbert, Pottsville.

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Committee on Enforcement of Dental Law—L. M. Weaver, Philadelphia; H. Zimmerman, Annville; T. W. Thomas, Wilkes-Barre.

Committee on Necrology—W. H. Trueman, Philadelphia; W. H. Scholl, Reading; George W. Klump, Williamsport.

Legislative Committee—C. B. Bratt, Pittsburgh; Geo. F. Root, Philadelphia; M. C. Barner, Jersey Shore; J. M. Crosby, Bradford; V. H. McAlpin, Warren; A. S. Koser, Harrisburg; Geo. W. Klump, Williamsport; H. E. Trostel, York; J. C. Reed, Harrisburg.

Committee on Oral Hygiene and Public School Dental Education—G. S. Schlegel, Reading; H. W. Heckel, Pittsburgh; S. B. Luckie, Chester; W. B. Mausteller, Harrisburg; P. B. McCullough, Philadelphia.

Committee on Reorganization—J. G. Lane, Philadelphia; P. B. McCullough, Philadelphia; J. C. Salvas, Philadelphia.

GEO. S. SCHLEGEL, *Corresponding Sec'y*,
Reading, Pa.

PRIZE COMPETITION

OF THE

Zentralverband der Oesterreichischen Stomatologen.

In view of the tenth anniversary of its organization, the Zentralverband offers a prize of K.500.00 ($100.00) for the best heretofore unpublished essay on any subject of stomatology. Only those papers which are submitted by medical men and dentists to the president of the association (Vienna I, Graben 31) between March 1, 1912, and February 28, 1913, will be admitted to the competition.

An essay cannot be withdrawn after once having been handed in.

The judges reserve the right to divide the prize into two equal parts, should two essays of equal value be submitted. If none of the essays is adjudged worthy of the prize, the competition may be kept open for a further period not exceeding two years.

The author agrees to place his work at the disposal of the *Oesterreichische Zeitschrift fuer Stomatologie* for original publication.

The essays must be handed in ready for publication, and will if possible appear within the period open for the competition. Every essay published will be paid for at the usual rate of K.80.00 ($16.00) per galley. The cost of printing, including the illustrations, will be borne by the journal.

For the Zentralverband der Oesterreichischen Stomatologen:

Dr. W. Herz-Fraenkl, *Pres.*,
Dr. Rudolf Bum, *Sec'y.*

EXAMINATION OF DENTISTS FOR THE U. S. ARMY.

The Surgeon-general of the army announces that examinations for the appointment of acting dental surgeons will be held at Fort Slocum, N. Y.; Columbus Barracks, Ohio; Jefferson Barracks, Mo.; Fort Logan, Colo., and Fort McDowell, Cal., on Monday, October 7, 1912.

Application blanks and full information concerning these examinations can be procured by addressing the Surgeon-general U. S. Army, Washington, D. C.

The essential requirements to securing an invitation are that the applicant shall be a citizen of the United States, shall be between twenty-one and twenty-seven years of age, a graduate of a dental school legally authorized to confer the degree of D.D.S., and shall be of good moral character and habits.

Acting dental surgeons are employed under a three years' contract, at the rate of $150 per month. They are entitled to traveling allowances in obeying their first orders, in changing stations, and in returning to their homes at termination of service. They also have the privilege of purchasing certain supplies at the army commissary. After three years' service, if found qualified, they are promoted to the grade of dental surgeon with the rank of first lieutenant, and receive thereafter the pay and allowances appertaining to that rank.

ARMY DENTAL SURGEONS.

Memoranda of Changes.

For the week ending August 17, 1912:

Charles E. Sherwood, act.d.s. August 6th, ordered to proceed to Fort Rosecrans, Cal., for temporary duty.

M. Sanderson, act.d.s. August 7th, reported for duty at Fort Slocum, N. Y.

First Lieut. Edwin P. Tignor. August 10th, reported for duty at Fort Monroe, Virginia.

First Lieut. Julien R. Bernheim. August 12th, relieved from duty at Fort Sheridan, Ill., and ordered to Fort Logan, Colo., for duty.

First Lieut. Clarence E. Lauderdale. August 12th, relieved from duty at Fort Logan, Colo., and ordered to Fort Sheridan, Ill., for duty.

For the week ending August 24th:

First Lieut. John H. Hess. August 9th, left from temporary duty at Fort Apache, *en route* to Fort Huachuca, Ariz., for temporary duty; arrived at Fort Huachuca, Ariz., August 12th.

Charles E. Sherwood, act.d.s. August 12th, left Presidio of Monterey, Cal., *en route* to Fort Rosecrans, Cal., for temporary duty. August 13th, reported for temporary duty at Fort Rosecrans.

First Lieut. Frank P. Stone. August 16th, reported for temporary duty at Fort Constitution, N. H.

A. T. Knoderer, ACT.D.S. August 20th, left Fort Barrancas, Fla., *en route* to Fort Dade, Fla., for temporary duty.

First Lieut. Alden Carpenter. August 20th, returned to West Point, N. Y., from leave of absence.

For the week ending August 31st:

A. T. Knoderer, ACT.D.S. August 22d, reported for temporary duty at Fort Dade, Fla.

Chas. B. Seely, Jr., ACT.D.S. August 23d, left Fort Sam Houston, Texas, for temporary duty; arrived at Fort Clark same date.

First Lieut. C. E. Lauderdale. August 22d, granted three months' leave of absence.

James F. Feely, ACT.D.S. August 21st, reported for duty at Fort Wright, N. Y.

First Lieut. Frank P. Stone. August 24th, reported for temporary duty at Fort Williams, Me.

Chas. DeW. Deyton, ACT.D.S. August 27th, relieved from duty at Vancouver Barracks, Washington, and ordered to the Philippine Islands, on the October 5th transport.

For the week ending September 7th:

A. T. Knoderer, ACT.D.S. August 31st reported for temporary duty at Key West Barracks, Fla.

First Lieut. J. R. Bernheim. September 1st, reported for duty at Fort Logan, Colo.

For the week ending September 14th:

First Lieut. John H. Hess. August 31st, ordered to proceed to Fort Huachuca, target range, and to Nogales, Warren, and Douglas, Ariz., for temporary duty.

First Lieut. R. E. Ingalls. September 1st, returned to Vancouver Barracks, Wash., from leave of absence.

First Lieut. C. E. Lauderdale. September 6th, left Fort Logan, Colo., on three months' leave.

First Lieut. S. D. Boak. September 9th, left West Point, N. Y., on seven days' leave of absence.

Chas. DeW. Deyton, ACT.D.S. August 30th, ordered to Forts Worden, Flagler, Casey, Ward, and Lawton, Wash., for temporary duty.

C. E. Sherwood, ACT.D.S. September 2d, left from temporary duty at Fort Rosecrans, *en route* to Galexico, Cal., for temporary duty.

UNITED STATES PATENTS

PERTAINING OR APPLICABLE TO DENTISTRY

ISSUED DURING AUGUST 1912.

August 6.

No. 1,034,591, to FRANK F. DOUDS. Band-forming pliers.

No. 1,034,764, to GEORGE L. BRUCE. Dental vulcanizer.

August 13.

No. 1,035,239, to DAVID A. ROSENTHAL. Dental broach and holder.

No. 1,035,688, to GEORGE CARR. Artificial tooth-crown and backing.

No. 1,035,744, to THOMAS W. ROSS. Dental post-extractor.

August 20.

No. 1,035,855, to GILDEROY O. BURLEW. Tool for fastening metal tooth backings.

No. 1,035,950, to ADDISON R. DEPASS. Method of protecting dental work.

No. 1,036,441, to FRED E. BUCK. Dental apparatus.

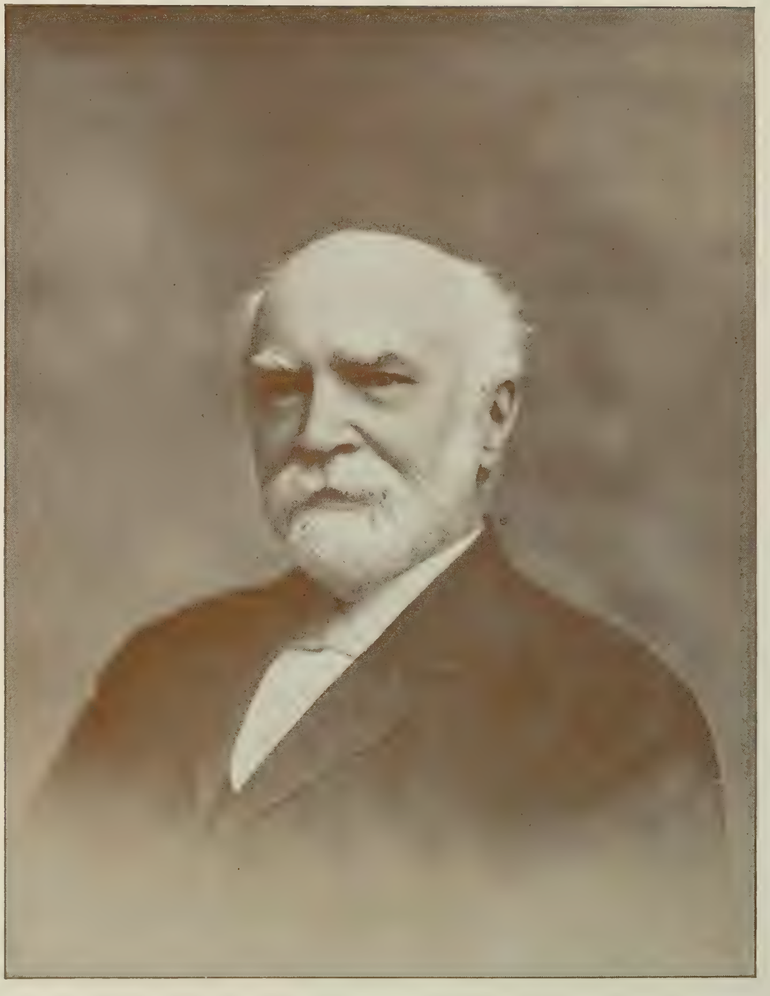
August 27.

No. 1,036,561, to FRANCIS A. CARTER. Dental process.

No. 1,036,562, to FRANCIS A. CARTER. Artificial teeth.

No. 1,036,563, to FRANCIS A. CARTER. Dental casting machine.

No. 1,036,927, to WALTER B. STRUBLE, JR. Dentimeter.



Very Yours
C. S. Stockton

THE

DENTAL COSMOS.

VOL. LIV. NOVEMBER 1912. No. 11.

ORIGINAL COMMUNICATIONS.

ON SUPERNUMERARY TEETH IN MAN AND OTHER MAMMALS.

By RAYMOND C. OSBURN, Ph.D., Columbia University, New York, N. Y.

(Address to the Alumni Society of the Angle School of Orthodontia, at its sixth annual meeting.)

MOST of the irregularities and anomalies of the mammalian dentition have at one time or another been ascribed to atavism in the attempt to explain their occurrence. This has been especially true of supernumeraries, teeth present in any portion of the dental series beyond the number normal to the species. In man such extra teeth have been noted frequently by dentists, who, in accounting for their presence, have laid hold of the theory of reversion, and have applied it entirely without reason. Atavism may be defined as the recurrence of ancestral conditions in a species, or the reversion to ancestral type. It is thus a sort of long-distance heredity.

THEORY OF REVERSION OVERWORKED.

While not undertaking to disprove the theory of reversion in general, I wish to show that it has been much overworked in the attempt to account for supernumerary teeth; that, granting the general truth of the atavism theory, it fails utterly to explain certain points in regard to such teeth; that these anomalies can be explained satisfactorily by other means, and that there is no necessity for invoking a theory of reversion concerning the working of which we know nothing, merely to cover our ignorance.

A consideration of the great length of time involved in the derivation by reversion of most cases of supposed atavistic teeth would doubtless have caused the adherents of the reversion theory to be more careful in its application. Certain kinds of supernumerary teeth, in order to have an atavistic origin, must go back to a reptilian ancestry. Such a reversion carries us back into the Triassic period, over a lapse of time which a careful estimate places at ten millions of years.* At the beginning of the Lower Eocene period most of the present mammalian groups are known to have been well established, with their dental formulæ and tooth characters fairly on the way to their present condition. The earliest primates undoubtedly were present at this time, so that any supposed atavistic condition in man extending beyond the primates necessarily involves a lapse of over four million years. Similar estimates place the origin of the anthropoidea between two and three million years ago, and that of man himself at very probably one million.

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* The estimates here given are based upon those of Dr. C. D. Walcott, formerly Director of the U. S. Geological Survey (*Proc. American Association for the Advancement of Science*, vol. xlii, 1893).

EXAMPLES SHOWING INADEQUACY OF THE THEORY OF REVERSION.

Supposing, for the sake of argument, that the atavism explanation were the correct one, how far must the human being revert in order to be possessed of supernumerary teeth through heredity? This would vary somewhat according to the position in which the extra tooth occurs. Let us take first the case of an extra premolar. The American monkeys of the family Cebidæ have normally three premolars, but the old-world primates, from which the anthropoid apes and the human species originated, have only two such teeth. No fossil connecting-links between these groups are known, and the evidence is almost positive that they arose separately from a more primitive ancestral group. In order to explain the presence of a human third premolar by atavism, it would thus be necessary to revert to the time before this tooth was suppressed in the ancestral prosimian stock, which would take us back into the Eocene period, a lapse safely estimated at between two and three millions of years. For a third incisor it would be necessary to go back much farther, for not even the lemurs have more than two incisors normally on one side of the jaw. This would necessitate a reversion to the unknown group of fossil mammals from which the primate stock arose some four million years ago. The same is true for the fourth molar which occasionally appears in man—for no known primate, recent or fossil, ever normally possessed four molars.

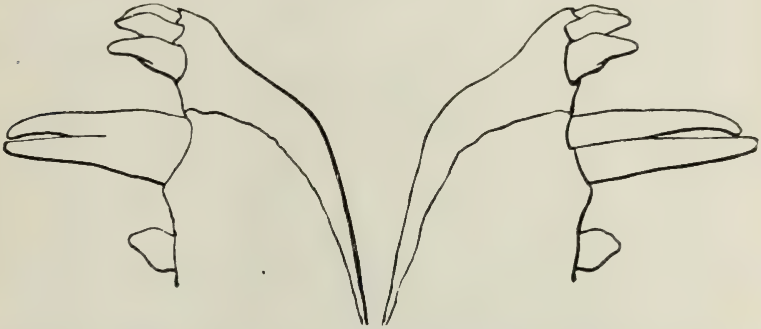
But, supposing that reversion extending back over millions of years, as required in the foregoing cases, were possible, what shall we say of the occurrence in mammals of a fifth premolar, a fifth molar, or a second canine? None of the modern groups of mammals have ever possessed normally five teeth in the premolar series, and, with the exception of certain edentates and toothed whales, where the number has been adaptively increased, none has ever had more than four molars. Even in the long extinct reptilian group of Theriodonts, from which the mammals arose, only a single canine was present on each side of the jaw, and only one has ever been present since the teeth began to differentiate into a heterodont condition for varying uses in the jaw. To explain the presence of a fifth molar or a fifth premolar by atavism, it would be necessary to hark back to the earliest Mesozoic mammals, over at least five or six millions of years, while for a second canine there is no ancestor sufficiently remote to which we can revert.

What are the probabilities that a tooth might be directly inherited from such a remote period? The reader is referred to Galton (*Proc. Royal Society of London,* 1897), and to Pearson ("Grammar of Science," 1900) for statements of the laws of ancestral inheritance (blended inheritance) and of reversion (exclusive inheritance). According to these laws, even in slow-breeding humanity, allowing but four generations to a century and only one hundred thousand years for the evolution of the human race, the intervention of four thousand generations reduces the possibility of the direct inheritance of even anthropoid characters in the teeth to practically *nil.* Yet numerical dental variations are so common in man that they are observed by every dentist. As Pearson points out, these supposed cases of atavism have nothing whatever to do with inheritance, but are abnormal variations.

CHARACTERISTICS OF SUPERNUMERARY TEETH.

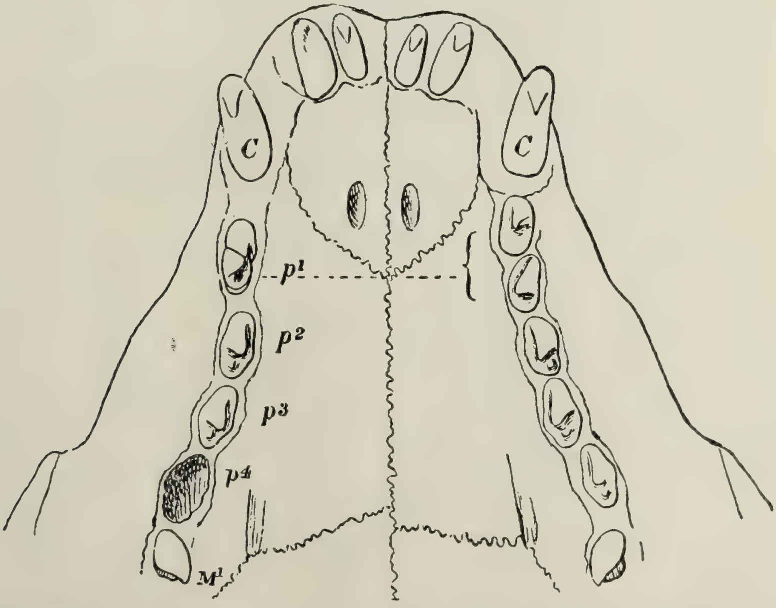
Supernumeraries all evidently belong to the same general class, and the explanation that will apply to a third incisor or premolar or a fourth molar in man ought to apply with equal force to a second canine or a fifth premolar or molar in any mammal. The theory of atavism evidently fails to offer a general explanation covering all these cases, even if we assume a reversion to the reptilian stage of evolution, which of itself involves too great a stretch of the imagination.

FIG. 1.



Right and left upper canines of a dog, showing extra canine on one side and partially divided canine on the other. (After Bateson.)

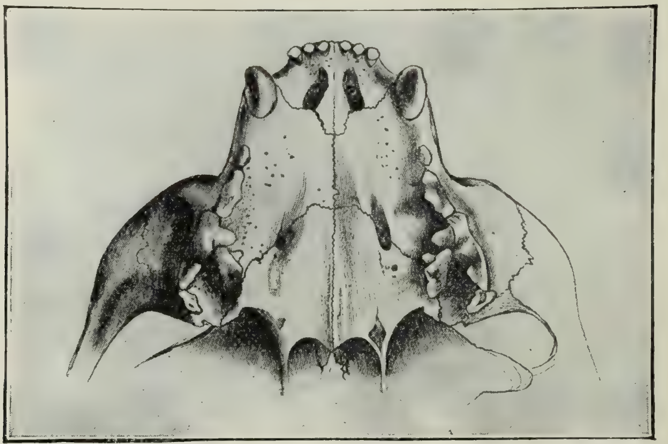
FIG. 2.



Supernumerary premolar on one side and partially divided premolar on the other, in a seal. (After Bateson.)

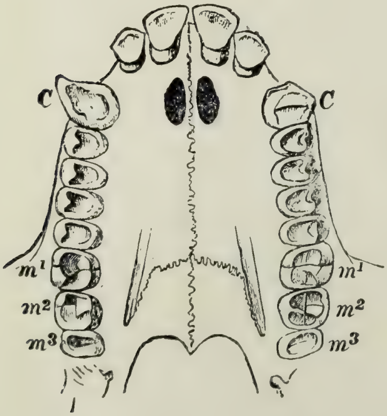
Another important difficulty in the way of accepting this explanation is the fact that the supposed atavistic teeth are often not at all atavistic in appearance. They may be the merest vestiges, as in the so-called "enamel drops;" they may be rudimentary, as in the conical "peg teeth;" they may present some intermediate condition of development; they may be monstrosities of various sorts, as in multiple-crowned teeth, or they may be perfect teeth of their respective series (incisor, premolar, etc.), and of the species in which they occur (man, cat, seal, etc.). According to the theory of reversion a third human premolar should show the characters possessed by such a tooth when it was a regular feature of the dental series in the ancestral stock. Instead of this, however, it is either an imperfectly developed tooth—*i.e.* pathological—or, if perfect in its development, it is distinctly a human premolar, and not that of an ancestral lemur. A fifth molar of the seal should be nothing else than reptilian, but instead it persists in developing as a characteristic seal premolar. (See Figs. 2, 3 and 4.)

Fig. 3.



Symmetrical duplicate carnassials in a cat, perfect in form, but smaller than the functional carnassials. (After Bateson.)

Fig. 4.

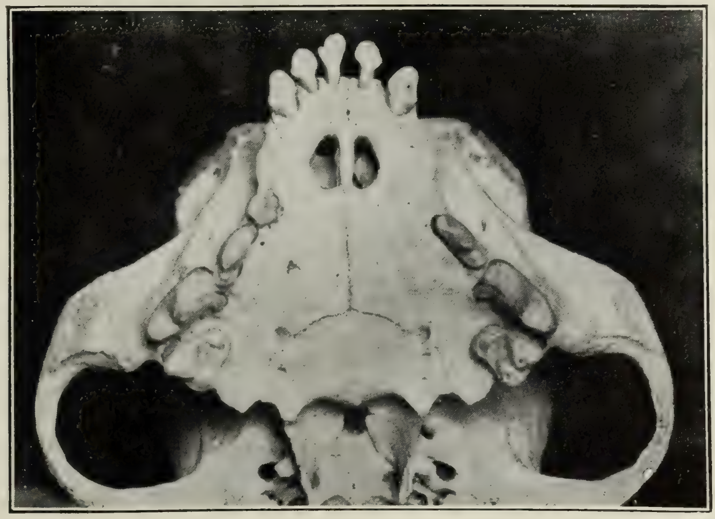


Symmetrical occurrence of four premolars in an American monkey, *Ateles*. The supernumeraries are not distinguishable by size or form. (After Bateson.)

A further obstacle in the way of the reversion theory as applied to supernumerary teeth is the fact that partially divided teeth are sometimes found. This condition is presented in all stages. The division may be indicated only by a slight groove, it may be a well-developed fissure, or the crown may be entirely divided and even the root partially separated. From this it is but a short step to the free supernumerary tooth. (See Figs. 1 and 2.)

Still another difficulty lies in the fact that teeth may be omitted from the series as well as added to it. It is conceivable that in some cases, as has been suggested, such an omission may have been due to an injury to the young tooth-germ, causing its failure to develop. But this explanation cannot be stretched sufficiently to cover cases in which this omission is symmetrical on both sides of the jaw, nor will it explain the fact that a certain tooth is present in one family of mammals and characteristically absent in a closely related family. I am convinced that this absence of teeth falls under the same general explanation as the presence of supernumeraries. (See Fig. 5—a Japanese pug dog with symmetrical absence of the second molar.)

Fig. 5.



Symmetrical absence of second molar in Japanses pug dog. (Original.)

EXPLANATIONS OF THE PHENOMENON OF SUPERNUMERARY TEETH AS ADVANCED BY VARIOUS WRITERS.

Before considering the probable explanation of these cases, however, let us glance briefly at some of the views that have been held by writers on the subject. It is manifestly impossible here to quote all the opinions on this matter that have been expressed in the voluminous literature, nor is it desirable even to mention all those who have contributed to one side or another of the argument. The reader is referred to the very complete literature list given by Paul de Terra.* The views given by different authors may be classified for convenience in the following three groups:

First: Those writers, such as Magitot, Thompson, and Wallisch, who attempt to explain all cases of supernumerary teeth as reversions to the more primitive conditions found in ancestral forms.

Second: Such writers as Selenka, Leche, Stehr, Adloff, Röse, and Black, who reject the atavism theory entirely, and who explain the lack as well as the excess of teeth as variations without meaning in phylogeny.

Third: The great majority of writers on the subject, who accept the theory of reversion for some classes of teeth but reject it in other cases. Among these there is one general point of agreement, in that they hold that certain typically developed teeth—*e.g.* a perfect premolar in man—at least are atavistic. (See the papers of Brunsman, Respinger, Baume, Busch, Von Metnitz, Schlosser, Bolk, Hensel, and De Terra.) The variations in the opinions of this last group of writers are interesting.

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* De Terra: "Vergleichende Anatomie des menschlichen Gebisses und der Zähne der Vertebraten," 1911, pp. 388–441.

Respinger, Kollman, Busch, and Von Metnitz, while maintaining the atavistic origin of normally formed extra teeth, assume a mechanical division or splitting of the tooth germ to account for "peg" teeth and other such abnormalities. Busch* has classified extra teeth as follows: (1) With conical crown and root—"peg" teeth; (2) with tubercles and a conical depression of the crown—multiple-cone teeth, and (3) with typical form —*Supplementarzähne* or supernumeraries; but, as De Terra shows, no line can be drawn between these classes.

Cases of supernumerary canines have been recorded by Scheff, Bastyr, and Mummery, who have discarded the atavism theory for these cases. Wallisch† sees in them, however, only an error of judgment in mistaking other teeth of conical form for supernumerary canines. He argues that it is only the position and not the form of the tooth that is to be considered; that there can be only one tooth in the position of the canine, and therefore only one canine.

De Terra (*loc. cit.*) apparently accepts this statement of the case, and further quotes Zuckerkandl,‡ who maintains that the supposed extra canine is nothing else than a return by atavism of a premolar which dates back to the time when three premolars were normally present in the ancestral stock from which man sprang. While it is possible that in some cases conical supernumerary premolars may have been mistaken for extra canines, there is no doubt whatever that the canine may be duplicated. Bateson has figured such a case in the dog (see Fig. 1), and similar cases are positively known to occur in man.

Most of these writers also consider a fourth molar in man as an atavism. Of this point it must be noted in contradiction that no recent or fossil primate is known to possess more than three molars. Bolk* attempts to get around this difficulty by his "terminal reduction" theory. He considers the fourth molar as due to reversion and as identical with the third molar present in some American monkeys. He must, therefore, derive the dentition of the old-world monkeys from that of the new-world monkeys of the family Cebidæ, which have three premolars and three molars, by supposing that the third premolar has taken on the form of a molar, and that the third molar is lost, to reappear occasionally as a supernumerary fourth molar. This is the merest guesswork, for there is no evidence anywhere in the primates or any other mammalian group of such substitution taking place, and there is no paleontological or other evidence that the old-world primates have been derived from those of America.

Schlosser has advanced the view that a fourth molar in man represents the last deciduous tooth of the Placentalia, held back and displaced, and occasionally reappearing as a supernumerary. This again is pure vaporizing, as there is not a particle of real evidence, embryological or paleontological, to build upon in the formation of such an hypothesis.

Hensel† thinks that the absence of teeth normal to the series is prophetic of the future condition of the species, while supernumerary teeth are atavistic, repeating ancestral conditions.

Wallisch (*loc. cit.*) attempts to sum up the evidence in favor of the atavism theory in the following manner:

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* Busch: "Ueberzahl und Unterzahl der Zähne des Menschlichen Gebisses." *Deutsche Monatsschrift für Zahnheilkunde,* 1897, No. 11.

† Wallisch: "Ueberzählige Zähne und Ihre Beziehungen zur Atavistischen Theorie." *Deutsche Monatsschrift für Zahnheilkunde,* 1897, No. 4.

‡ Zuckerkandl: "Ueber Rudimentäre Zähne," *Med. Jahrb.,* 1885.

* Bolk: "Beziehungen der Zahnformel der Platyrrhinen und Katarrhinen." *Oesterreichisch-Ungarische Vierteljahrsschrift für Zahnheilkunde,* 1907.

† Hensel: "Homologien und Varianten der Zahnform einiger Säugethiere." *Morphologische Jahrbücher,* Bd. 5, 1879.

(1) For all cases of supernumeraries in man, we find similar cases in lower animals.

(2) Supernumerary teeth erupt in certain positions in the series, unless forced into some other position.

(3) Complete reduction of the teeth may occur.

(4) Supernumeraries may run through generations.

(5) In going through the literature we find no case of supernumerary teeth that does not fall under the atavism theory.

In commenting upon the above points, we may state that the first, third, and fourth have no particular bearing on the subject, since they may be used, when they apply at all, with equal force on either side of the argument. Wallisch undoubtedly thinks that the fourth point is important, since an extra tooth—or the condition which produces it—may be hereditary. The fact of transmission is incontrovertible, but numerous other supernumerary structures are similarly inherited which are proved to have no meaning in phylogeny, and for which atavism offers no explanation—*e.g.* supernumerary digits in man and other mammals. The second statement is not true, for, as shown by Bateson on positive evidence, any tooth of the dental series may be partially divided or completely duplicated, though this is most common at the ends of series. The fifth statement is also untrue, for the literature yields numerous cases for which atavism fails to offer a satisfactory explanation, such as completely duplicated teeth, fifth molars and premolars of whatever character, not to mention the duplicate canines which are supposed by the "atavists" to be reversional first premolars.

BATESON'S "MATERIALS FOR THE STUDY OF VARIATION."

The most satisfactory presentation of the subject of dental variation has been made by Bateson in his book "Materials for the Study of Variation, Treated with Special Regard to Discontinuity in the Origin of Species" (1894). His results (pp. 195–273) are all the more interesting and important because his studies were not made for the purpose of bolstering up any special dental theory, but were considered in connection with many thousands of similar variations in all sorts of structures. Structures arranged in series, such as digits, ribs, vertebræ, teats, spines, teeth, etc., are especially liable to what Bateson calls "meristic," or numerical, variation. About three thousand skulls of lower mammals were studied by Bateson in collecting his data on dental variations, and, since his results have not found their way into dental literature, I cannot forbear giving a brief digest of them:

(1) Dental variations are rare in some forms and frequent in others, and it is to be noted that there is no indication that this frequency is dependent on any quality common to such forms. Aside from the presence and absence of certain small and variable teeth, the most frequent supernumeraries are found in domestic dogs, anthropoid apes, and seals. The European fox shows but little variation, the South American foxes a great deal. (Bateson does not consider variations in the human dentition.)

(2) Numerical variation in the dental series may be bilaterally symmetrical, but much more often is not. Symmetrical variations may occur on both sides of the same jaw, one side of both jaws, or on both sides of both jaws, but is always rare.

(3) Numerous cases occur in which two teeth represent one in the normal, and may have arisen by division of a single tooth-germ. Incomplete division was noted in a number of cases, usually at right angles to the jaw, but sometimes in other planes. If at right angles to the jaw, the complete division would place the extra tooth in series with the others; if otherwise, it would be out of the series. (See Figs. 1, 2, 3, and 4, after Bateson.)

(4) Twelve cases of duplicate teeth were encountered. Such teeth are on the same level in the jaw with others which they closely resemble. (See Fig. 3, after

Bateson.) Such teeth may intergrade with ordinary supernumerary teeth in form.

(5) Numerical variation is most common at the ends of series, in front of the premolars and behind the molars. This applies not only to extra teeth, but to the absence of teeth as well. (See Fig. 3, after Bateson, and Fig. 5.) There are many cases in the small premolars of the carnivores, both of absence of and of extra teeth. This mode of variation is not limited to teeth, but is common to structures occurring in series, such as digits, ribs, vertebræ, etc. For example, the buds on a stem are usually regular in position, but vary in exactly the same way. Thorns on the stems of briars are usually exceedingly regular, but frequently a thorn will have two points and every condition between this and two thorns placed together in a series can be found. Similar phenomena are seen in the dermal spines of the shark, which are closely comparable to teeth. These may even be triple or quadruple.

(6) There is a fairly constant relation between the size of extra teeth and the ones next to which they stand, so that the new teeth have a size and form suitable to their position. The teeth next to which they stand may vary in correlation with the presence of a new tooth next to them. This rule applies also to other series in variation (ribs, digits, etc.). "The members of a series are bound together in one common whole, and so the addition of a member to the series may be correlated with a change in the others, so that the general configuration of the whole series may be preserved. In this case, the new member of the series seems to have been reckoned for in the original constitution of the series."

(7) The members of a series may be remodeled so that the supposed individuality of the members is superseded. For example, in the jaw of an American monkey (*Ateles*) with four premolars (see Fig. 4, after Bateson), there is nothing to indicate that any one of the four is the extra. "In such a case I submit that the four premolars must be regarded collectively as equivalent to the three premolars of the normal. The epithelium, which normally gives rise to three tooth-germs, has here given rise to four, and I believe that it is as impossible to analyze the four teeth and apportion them out among the three teeth as it would be to homologize the three sides of a triangle with the sides of a square of the same peripheral measurement. This question at once suggests itself: Can the three premolars of the new-world monkeys be made to correspond individually to the two of the old-world primates?"

A couple of points previously raised demand some further discussion:

(1) What is the meaning of duplicate teeth? Such a tooth as that figured by Bateson (see Fig. 3) for the cat could only have arisen by division or duplication of a tooth-germ. No ancestor of the carnivora ever had two carnassial teeth, so that it is impossible to homologize the internal tooth shown in the figure with a lost tooth of any ancestor of the cat. It will be noticed at a glance that the extra tooth is not of a character ancestral to anything, but is the exact duplicate, except in size, of the functional carnassial beside which it is placed. It is as impossible to consider such a tooth due to reversion as to hold that a sixth digit of a cat's paw or of the human hand is due to atavism, for no ancestor of the cat or the human ever normally possessed such a digit.

(2) This statement applies with equal force to the presence of a fifth tooth in the premolar series of a seal (see Fig. 2). Only the splitting of a tooth-germ, an extra bud given off by the dental lamina, or the reconstitution of the series, can explain the phenomenon.

DENTAL ABNORMALITIES AS EXPLAINED BY ACCIDENTAL SPLITTING OF TOOTH-GERMS.

Since it is necessary to cast aside the reversion theory in accounting for the cases above mentioned, why should we feel called upon to explain a third incisor or premolar or a fourth molar in man, or a supernumerary in any position in any mammal, by the assumption that they are reversional and have been inherited from remote ancestors? Our knowledge of heredity, development, and evolution is opposed to this view, and there is absolutely no positive evidence in favor of it.

Since atavism fails to explain these abnormalities of dentition, some other hypothesis must be constructed to account for their presence. One such hypothesis has already been proposed by Leche, Röse, and others, who have assumed that supernumerary teeth are due to the accidental splitting of the tooth-germs so that two teeth are produced from a single germ. The word "accidental" in this case, it must be observed, is used to cover causes, of which nothing is known, which result in the production of two teeth where one appears in the normal. It may be possible to trace this condition to the manner in which germs are budded off from the dental lamina, to the reduplication of a germ from the lamina, by the appearance of two buds in place of one, or by a complete reconstruction of the series derived from the lamina, as suggested by Bateson.

Any of these processes would result in the production of supernumerary teeth without any significance in the phylogenetic history of a species. This view is in no way interfered with by the fact that such supernumeraries, or the condition producing them, may be inherited, for we have ample evidence in other abnormalities, such as extra digits of man and lower animals (hyperdactyly), that these structures may "run through generation after generation" without any possibility of their derivation by atavism.

DENTAL ABNORMALITIES AS EXPLAINED BY ABNORMAL DEVELOPMENT OF THE ENAMEL ORGAN OF A TOOTH-GERM.

An explanation, which occurred independently to the writer previous to examining the literature, is strongly set forth in a paper by Dr. G. V. Black.* That paper deals only with the human dentition, and a large portion of it is given over to the treatment of cases, but the ninety figures, representing all sorts of conditions from "enamel drops" to fully developed teeth, and from closely united gemmate or twinned teeth to completely separated duplicate teeth, are of great interest, as is also the discussion of the causes of supernumeraries. Dr. Black rejects the atavism theory *in toto,* and offers what seems to be a satisfactory explanation based on embryological studies. Briefly stated, the theory—for which Black foregoes any claim to priority—is this: The enamel germ is the important structure in originating a tooth, since it is the first rudiment to appear, and its presence conditions the formation of the dentinal papilla. Moreover, the size and the form of the papilla, and therefore of the tooth, are dependent upon the size and form of the enamel organ. This organ arises by proliferation from the dental lamina, a continuous plate of cells turned in from the embryonic oral epithelium. The rods of cells which arise from the dental lamina, and which give rise to the enamel organs, are by no means always limited to a single proliferation for each tooth of the normal series, but accessory rods are often observed. The complete evidence is lacking, but we may infer that if the proliferations appear in regular order and number the members of the dental series will develop in an orderly fashion, both in number and in position.

But any proliferation of epithelial cells from the lamina, if it is of sufficient size and penetrates deeply enough into the tissues, may give rise to an enamel organ and consequently to a tooth. We have the embryological evidence that such proliferations do occur. The extent of their development is probably related to their position in the jaw. If situated deeply in or near the position of those which give rise to normal teeth, they may develop into what Bateson calls duplicate teeth, or fully developed supernumeraries. When in the series, they may account for the reconstruction of the series suggested by Bateson. If located too close to the normal germs, they may by growth become fused with them, giving rise to the various forms of "twin," or partially divided teeth. If situated too far laterally they may not receive sufficient nourishment, and develop into "peg" or conical teeth, or, if too superficial, may entirely fail to develop. If the germs are very small, they give rise merely to the so-called "enamel drops." Multiple-cone teeth (see Figs. 6 and 7) and the so-called "transposed molars" occasionally found in the incisor series (see Fig. 8), are undoubtedly due also to the abnormal development of the enamel organ of a tooth-germ.

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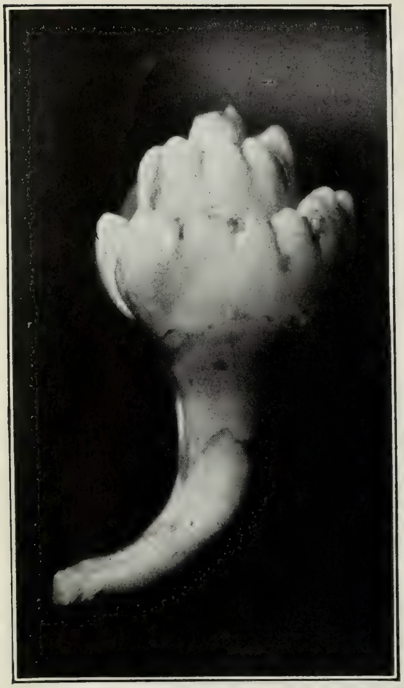
* "Supernumerary Teeth," *Dental Summary,* January and February, 1909.

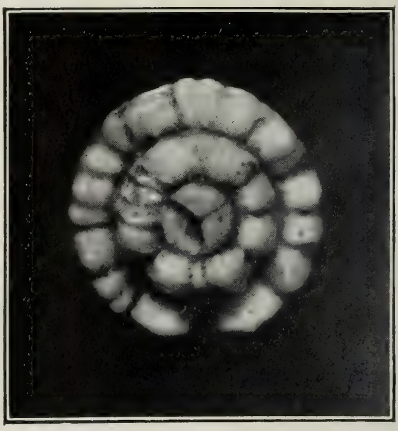
Fig. 6.



A remarkable multiple-cone tooth—history unknown; several times enlarged. (Original.)

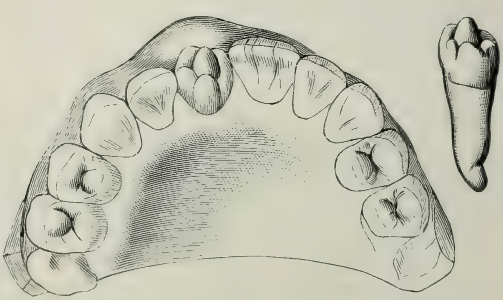
The conical peg teeth which occasionally appear in the human dentition in place of one of the normal series may likewise be explained, if we suppose that the enamel organ either arose from too small a bud or that for some reason it failed to receive sufficient nourishment at the time of its development. This idea will supplant the foolish notion of "insufficient growth force," which has been proposed to cover some such cases. I am aware that we are replacing one assumption by another, but at least we have the advantage that we are dealing with processes which we can understand, and for which observation and experimentation show analogous cases.

Fig. 7.



Crown view of the tooth shown in Fig. 6. (Original.)

Fig. 8.



A similar but much simpler multiple-cone tooth replacing a central incisor in man. (Cosmos, November 1883.)

CONCLUSIONS.

We may sum up the evidence against the origin of supernumerary teeth by reversion in the following statements:

(1) A third premolar, a third incisor, or a fourth molar in man could only be accounted for as atavisms by a reversion covering so long a period of time that this alone is sufficient to render the theory untenable in the light of our modern knowledge of heredity.

(2) A second canine in man or lower mammals cannot, by the remotest possibility, be due to reversion, since there is no ancestral condition to which it could revert.

(3) Supernumerary teeth seldom present characters which, by any stretch of the imagination, could be called atavistic. They may have a conical form or be otherwise rudimentary or vestigial, but they do not present ancestral characters.

(4) Duplicate teeth often occur, either in or out of the series, which are so similar to those normally present that it is impossible to state which is the supernumerary. Such teeth are not atavistic in character, and it is futile to attempt to explain them as such.

(5) Teeth may be omitted from any part of a series—a fact for which reversion offers no explanation, but this fact falls in line with our knowledge of variation of serial structures.

(6) Discontinuous variations of a similar character, for which atavism offers no explanation, often occur in other structures of a serial nature.

(7) Supernumerary teeth may occur at any point in the series, sometimes where it is known that no teeth have been lost. Such, for example, are the fifth premolar of some mammals, notably the seals; a fifth molar; the duplicate carnassial recorded by Bateson, etc.

(8) The paleontological record of the evolution of the teeth, which is fairly complete in all mammalian orders, lends no support to the theory of atavism as applied to supernumeraries.

(9) Embryological studies indicate the not infrequent occurrence of irregularly situated epithelial cords which arise from the dental lamina, and which, if able to penetrate to a proper region for development, might give rise to enamel organs, and hence to supernumerary teeth.

MANIPULATION OF GOLD FOIL.

By **CHAS. E. WOODBURY**, D.D.S., Council Bluffs, Iowa.

(Read before the Pennsylvania State Dental Society, at Pittsburgh, June 11, 1912.)

THE restoration of lost tooth structure and the prevention of such loss is, in my opinion, the most important duty which we dentists are called upon to perform. We are able to do much by prophylactic treatment and correct hygiene, but until some treatment has been discovered which will prevent absolutely the destruction of tooth substance by dental caries, the largest part of our practice will consist in making good this loss. It therefore behooves us to study carefully how this restoration may be made in the most permanent manner.

GOLD FOIL FILLINGS VS. CAST GOLD INLAYS.

At the present time, presuming proper manipulation and technique, gold is accorded by almost all practitioners of dentistry the highest place of honor. There is, however, a great diversity of opinion as to which one of the two great methods —the foil filling or the gold inlay—is deserving of the preference. It is the opinion of the writer that each of the two methods has its own particular place in our practice, and in that particular place each is unexcelled. What that place is depends very largely on the degree of skill which has been attained in the manipulation of gold foil by each individual operator. Where one operator may be able to make a perfect operation with gold foil, another, on account of a less careful technique, may have a failure, and there is no question that even an improperly made and placed inlay is infinitely better than a poorly made foil operation. In the selection of operations, therefore, every operator must be a law unto himself. It has occurred to me that many of our most enthusiastic advocates of the gold inlay are men who have never had more than a fair degree of success in the manipulation of gold foil in cavities that are somewhat difficult of access. Many operators who use gold foil in the front teeth and gold inlays in the back ones practically admit the excellence of the gold foil, but at the same time express lack of confidence in their ability to use it in the back teeth, where they have not mastered the technique of its manipulation. Other operators use no gold foil at all, employing inlays in every case, and I have no doubt that in their hands the inlay serves its purpose better than would a gold-foil operation. We are all free to acknowledge that an improperly made gold-foil filling is the worst method we have for restoring lost tooth substance. Still another class of operators profess to have no use for inlays at all, gold foil and amalgam being sufficient for their needs. To my mind it is ever the case that the less confidence a dentist has in his ability as a gold-foil operator, the more extensively he uses inlays where otherwise he would be obliged to use amalgam.

It is noteworthy that no inlay enthusiast ever asserts that the best inlay is any better than the best gold-foil filling, yet he advocates its use on account of the ease of its manipulation, and from consideration of the patient's feelings.

The indications for the gold-foil filling and the gold inlay which are given in the following paragraphs have been based by the writer on his estimation of his own technical skill in either method, and should be modified by every operator to meet his own individual qualifications.

INDICATIONS FOR GOLD-FOIL FILLINGS.

Five conditions are necessary to enable us to make a good gold-foil filling, namely:

(1) The cavities must be sufficiently accessible so that a correct line of force with a direct or back-action plugger may be obtained.

(2) The cavities must have sufficient dentin to support the walls, so that gold foil may be wedged against them without danger of fracture.

(3) The teeth must have reasonably healthy peridental membranes.

(4) The teeth must be fully developed in the apical regions.

(5) The patient must be possessed of sufficient nervous and physical strength to sit with the rubber dam in place for a period of from one to two hours.

The conditions, then, under which gold-foil operations are indicated, are: Cavities which can be made accessible, and which have fairly strong walls; teeth that have healthy peridental membranes, and patients enjoying a reasonable amount of physical and nervous strength. These conditions embrace about three-fourths of the cavities to be treated anteriorly to the distal surfaces of second molars.

INDICATIONS FOR INLAYS AND AMALGAM FILLINGS.

Inlays and amalgam operations are indicated in the following conditions: In cavities that are inaccessible; in cavities in teeth which are attacked with pyorrhea, interstitial gingivitis, or any other inflammation which renders the teeth so sensitive that it would be unwise to subject them to the malleting necessary in condensing gold foil; in large cavities in the teeth of children; in cavities approximating bridge work over which the rubber dam cannot be placed; in persons whose jaw muscles are affected with cramps; in the restoration of tooth structure lost by mechanical or chemical abrasions on the occlusal surfaces; in cavities in teeth from which the pulp has been removed, and in which the enamel walls are not well supported by dentin; in cavities which are so large that otherwise a crown would be necessary; in restorations of the incisal angle in the lower front teeth where the anchorage may be reinforced by the use of a post in the root-canal.

TECHNIQUE OF MANIPULATION OF GOLD FOIL.

The writer presents the following for the purpose of encouraging the acquisition of a more careful technique in the manipulation of gold foil by the average practitioner, so that he may have confidence in his ability to use it wherever, in his judgment, it is indicated. It seems a peculiar fact that this, the original method of repairing the ravages of dental caries, is so little understood and so carelessly practiced by the profession at large.

The ideas which I am about to explain are in no way original with me, or, in fact, with any one man. They are the accumulated thoughts of the best men of the past and present, which have been gathered together and systematized by Dr. G. V. Black. He has added to them the results of his own extensive experiments and experiences, and has given them to us for our use. We should all unite to do honor to this great man, who, I believe, has done more for the dental profession than any other man. Drawings and photographs by Drs. G. V. Black and Wm. Finn have been freely used in the preparation of this paper, and due credit is cheerfully given for them. Credit should also be given to Dr. E. K. Wedelstaedt, not so much for what he has written, but for what he has done through clinics, demonstrations, and experiments.

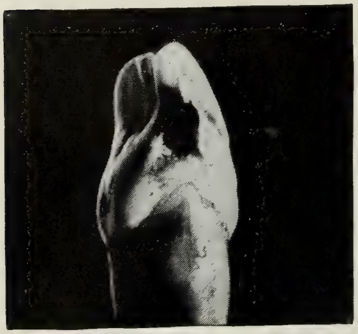
PRELIMINARY OBSERVATIONS.

When a patient presents himself for an operation the first thing to do is thoroughly to free the tooth to be operated upon and three or four teeth adjoining it on each side from all deposits of any nature. The occlusion of the teeth is then carefully studied, noting the direction of force, approximating its amount and studying the places of wear which indicate the planes of occlusion. All of these preliminaries are necessary to insure the adequate resistance form of the cavity, to learn where to place the contact point, and to estimate the degree of density that the filling should possess, or to decide whether in the case under treatment the use of an inlay would be most advantageous.

APPLICATION OF RUBBER DAM.

The teeth having been thoroughly cleaned and the occlusion having been noted, the rubber dam is applied, not only to the tooth to be operated on but to one or two teeth back of it and to four or five teeth in front of it. This application of the rubber dam is easily made, if the technique is mastered. If a bicuspid is to be operated upon, the dam should extend from the central incisor to the first molar. If one of the incisors is to be operated upon, the dam should extend from the first bicuspid on one side to the first bicuspid on the other side. The reason for this is that the field of operation is in no way obscured by the dam, and the manipulation of disks, strips, and instruments is rendered much easier. A fair-sized piece of six-inch dam should be selected, and the holes punched to conform in curve and distance to the teeth over which it is to be stretched. The oral side of the dam around these holes is covered with antiseptic soap to lubricate it, and facilitate its passage between the teeth. If the dentist is operating with an assistant, as he should, he will start the adjustment of the rubber dam on the incisor to be covered, working it between the teeth, the assistant helping the dam through with a ligature. This is done with each successive space, until the molar is reached, and the clamp is adjusted. If he is operating without an assistant, which he should not do, he will find it easier to set the clamp on the molar, using a rather large hole in the rubber dam for this tooth. The dam should be well lubricated with soap and stretched over the clamp and tooth, operating it from this tooth, and using a ligature fork to help the rubber into the interproximal spaces. Only the teeth on each side of the space to be operated on need to be ligated. The edge of the dam is curled under the free margin of the gum with an instrument or ligature, and the teeth are washed with alcohol and dried. It will then be found that the rubber dam will both exclude the moisture and stay in place without being tied. A word of caution may not be out of place in regard to the use of the ligature, as in many cases irreparable injury has been done by forcing ligatures up so high in the septal area as to separate the peridental membrane (Fig. 1) from the cementum and invite a case of pyorrhea.

Fig. 1.



The more often the operator uses the rubber dam, the more expert will he become in its application; he will learn many ways of overcoming difficulties that to one unaccustomed to its use would seem insurmountable. With the help of an assistant, it should not require over two or three minutes to adjust the rubber dam over six or seven teeth, provided that the conditions are normal. Unusual conditions, of course, require more time. The application of the rubber dam is generally considered to be a consumer of time. This is not, however, the case. It is a saver of time. An operator will not only expedite but make better operations, if he will use the rubber dam wherever it can be applied. The assistant will keep the cavity cool and free from chips or dust with the air-syringe. The operator can see perfectly clearly what he is doing, which is very different from operating in a cavity half filled with moisture and tooth débris, which must often be washed out. This washing out and the necessary spitting often consume almost as much time as the actual operating on the cavity. But most important of all is the definiteness with which all the lines and grooves are brought out. Many a groove which, in a moist cavity, will appear sound and hard, will, when thoroughly dry, show very plainly the aperture through which the micro-organisms of decay have started their deadly work. Equally important, also, is the fact that when the cavity preparation is completed, its walls are perfectly free from mucus or any other substance of an unclean nature, a condition which, according to Dr. Black, is very essential to a perfect operation.

The teeth in the vicinity of the one to be operated upon are now clean, the planes of occlusion have been noted, the diagnosis has been made, the rubber dam is adjusted, and the cavity has been prepared with attention to extension for prevention and convenience, the retention and resistance form well provided for, the cavo-surface angle beveled, and the cavity surface freed from dust. As we make the operation, let us consider some of the characteristics of the material we are to use.

ANNEALING OF GOLD FOIL.

Gold is the only known metal which possesses the quality of welding perfectly when cold. To do this, however, it must be absolutely pure, and have its surfaces free from deposits of every kind. Deposits that are apt to interfere with the welding of the gold are left by the condensation of certain gases. Most of these deposits can be volatilized by heat; therefore the gold is heated to a cherry-red before using. This may be accomplished by the open flame or, better yet, with an electric annealer. If the open flame is used, care should be taken in lighting the lamp not to touch the wick with a match, as enough phosphorus will stick to it to interfere with the cohesive properties of the gold. The gold should be carried to the lamp on the sharp point of a fine instrument. If the pliers are used, the part of the gold that comes to lie between the points of the pliers will not be annealed, and consequently will not be cohesive. If an annealer is used, a much longer time is required for proper annealing, from fifteen to thirty minutes, depending on the degree of heat generated. Care should be taken that sufficient time is allowed so that all deposits are volatilized.

There are certain deposits which are not volatilized by heat, the most important of which are left by carbonic acid, phosphorus, and sulfur. Gold foil which has been subjected to these gases without first having a protecting coating of some other substance is rendered permanently non-cohesive. Therefore, as a safety measure, it is deemed best to subject gold foil to the fumes of ammonia. It can then be handled with impunity, as the volatilization of the ammonia carries the other impurities with it.

GOLD FOIL COMPARED WITH CRYSTAL GOLD.

Gold is prepared for dental use by the manufacturers in many forms, the principal ones being gold foils and crystal golds. Excellent operations may be made with any of these forms. Many experiments have been conducted to determine their various excellences. The major part of these experiments prove that better operations may be made with less effort with foil than with the crystal gold, on account of the tendency of crystal gold to bridge. There is also another danger with crystal gold that is not present with foil. Crystal gold leaves the manufacturer's plant absolutely free from impurities or deposits; if, before being used, it has become contaminated by injurious gases, the operation will be ruined, and the operator will be none the wiser until the patient returns to show the failure.

PREPARATION OF THE GOLD FOR INSERTION IN CAVITY.

If foil gold is used, the pellets may be rolled by the dentist himself, or he may buy the manufactured pellets. The only advantage of hand-rolled pellets consists, in my opinion, in their shape being more convenient than that of the machine-rolled ones. Never buy gold either in the form of pellets or foil that is put up as cohesive foil. It is much safer to buy the non-cohesive foil, and burn off the coating. Some of the manufacturers put out a cohesive foil and pellets which they claim can be used without annealing. If this foil or these pellets were fully cohesive, they would mat so badly in the package that they could not be used, and any treatment which they have received to prevent their sticking together, partially at least, ruins the cohesiveness of the gold.

Fig. 2.

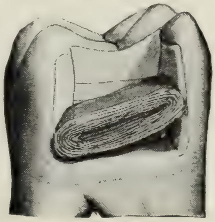
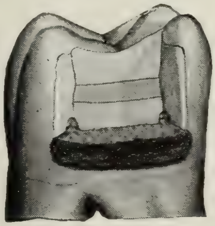


Fig. 3.



Those who have been familiarized with

Black's teachings, under Wedelstaedt, buy No. 4 non-cohesive or so-called soft foil, and cut it into one-eighths, one-sixteenths, one-thirty-seconds, and one-sixty-fourths of a sheet. This is done with shears, cutting through the book, paper, gold, and all. These pieces are taken with the pliers and fingers, the corners folded to the center and loosely rolled in the fingers into a round pellet.

Fig. 4.

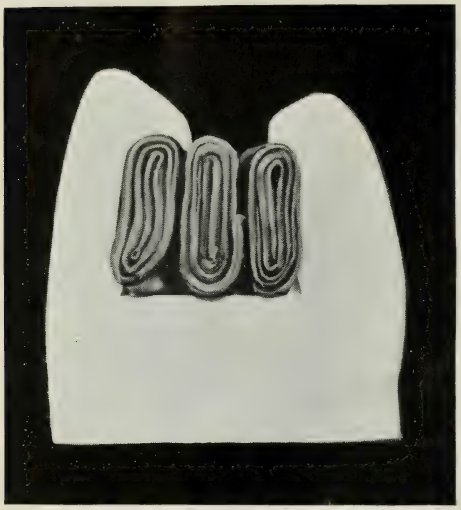


Fig. 6.

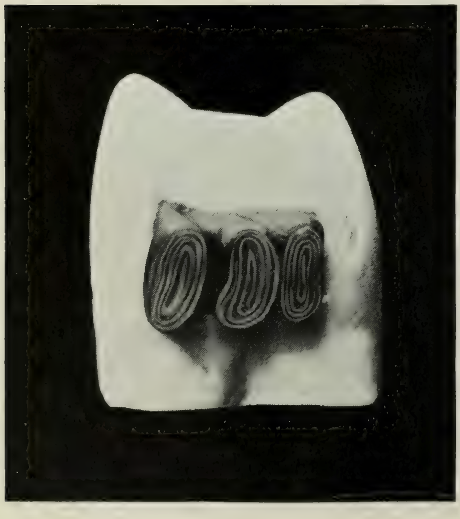
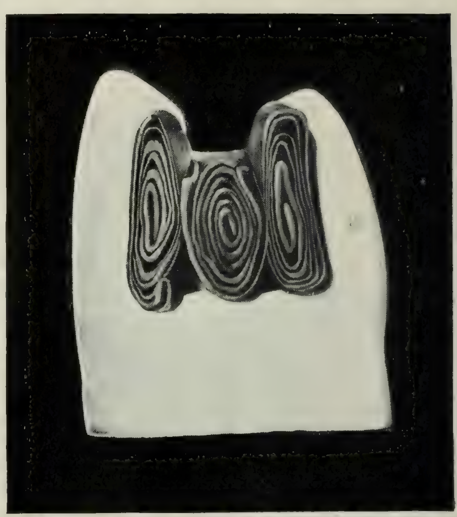
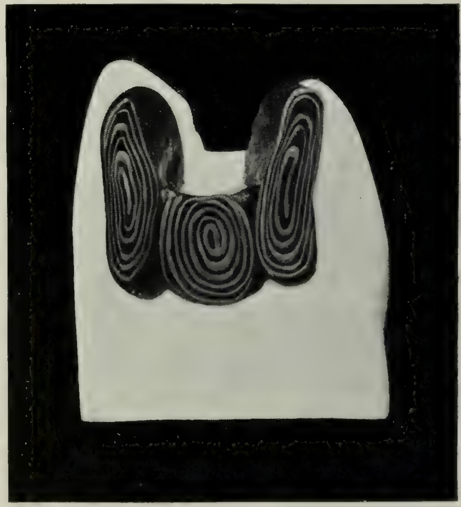


Fig. 5.



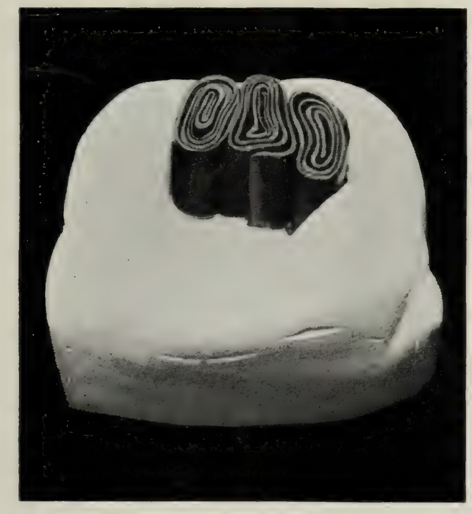
Cylinders, for use as non-cohesive gold, are made by cutting the sheets into halves and quarters, laying them on a towel and folding to the desired width, using the ends of the fingers of the left hand and a long-bladed dull knife, like a spatula,

Fig. 7.



in the right hand. They are rolled over a Swiss broach, and the ends are slightly flattened with a pair of foil-carriers.

FIG. 8.



INDICATIONS FOR COHESIVE AND NON-COHESIVE GOLD, AND METHODS OF INSERTION.

Gold of any kind receives a temper from being malleted. For this reason our operations with foil are much harder than our gold inlays made of pure cast gold; for this reason, also, we should be very careful to use the correct lines of force and the proper placing and stepping of the plugger while condensing cohesive gold. A piece of flat gold will lie upon an anvil evenly, but if it is struck in the center with a hammer, it can never by any manner of malleting be made to lie flat again. The same is apt to happen if we use cohesive gold in thin pieces, or go over it a second time. We should use non-cohesive foil whenever we are sure that it will be firmly held in place, either by the walls of the tooth or by cohesive gold. The folds of gold sliding on each other not only allow us to use larger pieces of foil, but they insure our producing a more perfect adaptation to the margin. For this reason, non-cohesive gold may be used in the gingival third or half of cavities in the proximo-occlusal surfaces of bicuspids and molars. Dr. Black tells us that, in the hands of our best operators, there are ten per cent. of failures when cohesive gold is used in the gingival portion of these cavities. Non-cohesive gold is used, also, in cavities in the occlusal, labial, and buccal surfaces, as these cavities all have five walls, and the gold may be securely

FIG. 9.

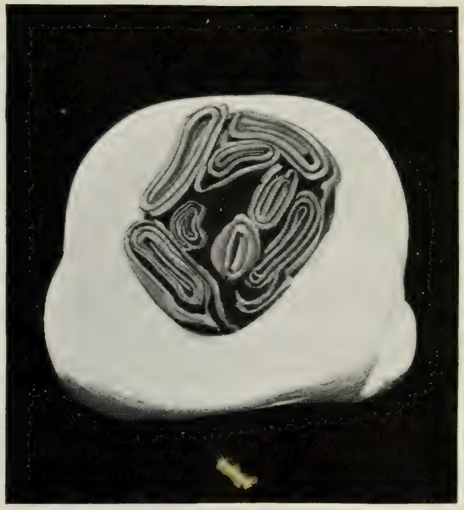
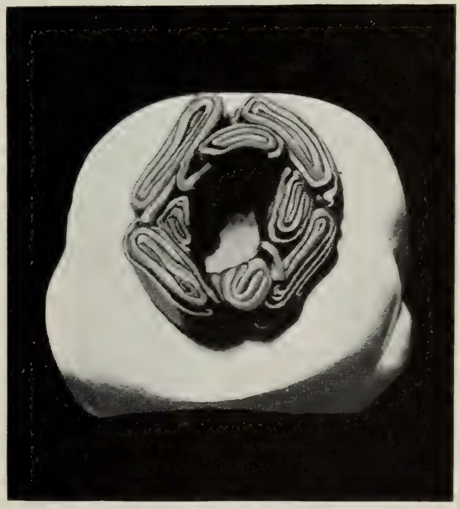


FIG. 10.



retained. The members of the profession who are not familiar with the technique of non-cohesive foil seem to dread it and consider it very difficult to use, probably because it is different from cohesive foil in its action. It is, however, far easier to handle than cohesive foil.

Proximo-occlusal cavities in bicuspids and molars. In cavities in the proximo-occlusal surfaces of bicuspids and molars, non-cohesive gold in the gingival half may be used either in the form of cylinders or of a mat. If the axial wall is very short, between the gingival and pulpal walls, a mat may be used to good advantage. A mat is simply an oblong cylinder, and is thicker in the center of the cavity than at the walls. (Fig. 2.) This can be avoided, however, by having the cylinder quite a little longer than the bucco-lingual diameter of the gingival wall, and folding the ends toward the center, thus making the mat of uniform thickness. Where it is so used, one end of the mat should be placed against the axial wall, with the other end extending into the interproximal space. One row of steps is taken, using a one-millimeter plugger along the axio-gingival line angle, beginning at the center of the cavity and operating toward either side, thus driving the gold into the angle. (Fig. 3.) No effort should be made to condense over the gingival margin until this gold is tied in with cohesive gold. If the axial wall is of normal length, it is better to use two or more cylinders (Figs. 4 and 5) flattened and placed side by side with one end against the axial wall and the other extending into the interproximal space. Enough cylinders may be used to fill the gingival part of the cavity even with the pulpal wall, care only being taken that it does not extend too near the contact point, which should always be made of cohesive gold. The center cylinders should be condensed first along the axial wall, thus driving them down between the side cylinders and forcing them against the buccal and lingual walls, keying the whole mass in position. (Figs. 6 and 7.) These cylinders should be condensed along the axial wall, holding the plugger at such an angle as to drive them into the axio-gingival line angle. They should be tied in with cohesive gold before they are condensed over the gingival wall.

Five-walled cavities. In cavities with five walls (Figs. 8 and 9), the cylinders should be placed around the periphery of the cavity, filling the fissures first and driving the cylinders against the axial walls with mallet force. (Fig. 10.) The center of the cavity may then be filled, working from the periphery toward the center. A pointed, round, hand instrument is pushed into the center of these cylinders, thus crowding them toward the cavity walls. One end of these cylinders rests on the pulpal or axial wall, as the case may be, the other end extending out of the cavity about one-fourth of its length. Enough cylinders may be used to fill the cavity, with the exception of a small opening in the center. The operation may now be completed with cohesive gold, malleting it against the non-cohesive gold in all directions, thus forming a wedge of the cohesive gold, and forcing the non-cohesive gold against the cavity walls. When this wedge has been made, the whole surface of the filling should be gone over, beginning with the center, operating toward the periphery, and the gold malleted into the cavity. Pluggers that are one millimeter in diameter should be used on non-cohesive gold, as the use of small pluggers will chop it to pieces instead of condensing it; sufficient density is obtained with the large plugger on account of the sliding of the leaves on one another. This may be followed by a plugger one-half millimeter in diameter, thus again going over the operation in consecutive circles from the center to the periphery.

COHESIVE-GOLD FILLINGS.

When making an operation of cohesive gold, the filling should be started by placing the first piece in a convenient point angle and building along the line angle (Fig. 11), laminating rather thick pieces one upon the other, until another point angle has been reached. No attempt should be made to cover a margin until it can be approached at an angle of 90°. (Fig. 12.) A margin should be approached from a thick mass of gold, otherwise there will be a tendency for it to curl away from the margins and walls. The plugger should incline toward the wall to be approached, and should be placed upon the gold in a series of steps, each one slightly overlapping the other. In a five-walled cavity (Fig. 13), the first row of steps should start near the center of the cavity and approach the wall; the next row should start at the place of beginning, and proceed in a line parallel with the first row of steps and as nearly as possible parallel with the wall to be approached, the last row driving the gold up against that wall. In a cavity involving a proximo-occlusal surface (Fig. 14), the first start should be made from the center of the cavity and proceed toward the margin. In this way every application of the plugger and every blow of the mallet tends to drive the gold into the cavity, thus forcing it more firmly against the walls. If the gold is condensed against the walls first, and in the center of the cavity afterward, the gold will be drawn away from the walls, and a leaky operation will result.

Fig. 11.

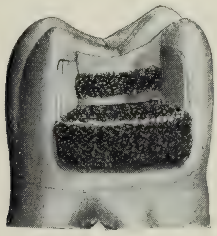
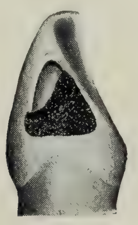
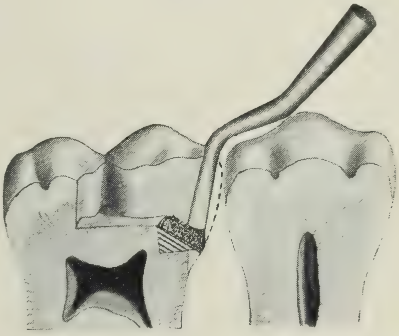


Fig. 13.



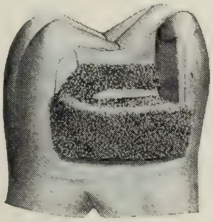
The stepping of the plugger is one of the most difficult features in the whole operation. The plugger must be lifted from the gold and set down again with force to one-twentieth of a millimeter of its proper position. The theory is very simple, but the technique is very difficult, and can only be acquired after long and painstaking practice.

Fig. 12.



We therefore see that in the manipulation of cohesive gold three things are of primary importance, viz, to approach the walls from thick masses, to obtain a correct line of force, and to step the plugger properly.

Fig. 14.



The walls being approached from thick masses of gold and the gold flowed against them and wedged by the line of force and accurate stepping, the elastic dentin of the tooth is compressed and forever hugs the filling with a grip that cannot be broken. When a cavity in which a gold operation is to be made is undercut, the cavity walls are weakened, and the manipulation of the gold is interfered with. Anyone who is at all expert with gold foil should be able to make a foil operation in a cavity with parallel walls which has been prepared for an inlay, obtaining his anchorage by compressing the dentin and driving the foil into the little inequalities left by the instruments. In making the cavity, the fact should never be lost sight of that after the cavity has been made it must be filled, and it should be so constructed that every part of it can be reached in a correct line of force in the making of the operation, and that full density of the material used can be obtained.

Fig. 15.

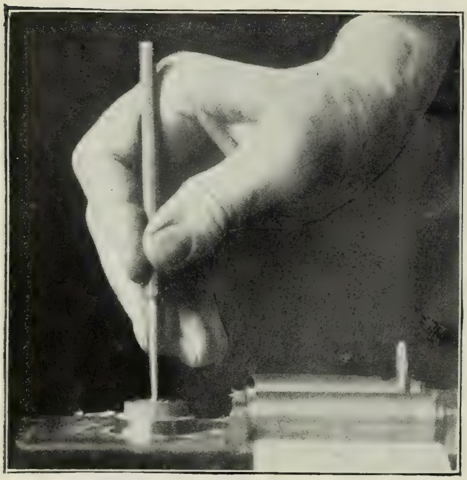


Fig. 16.

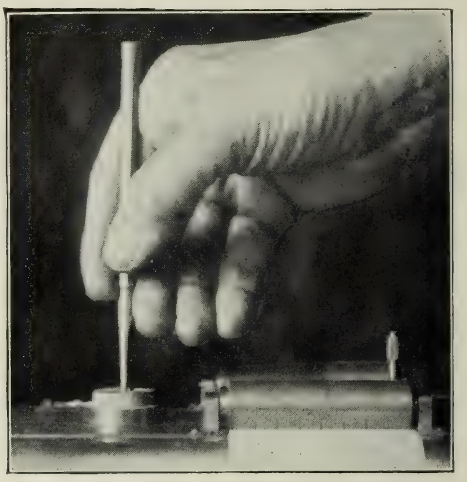
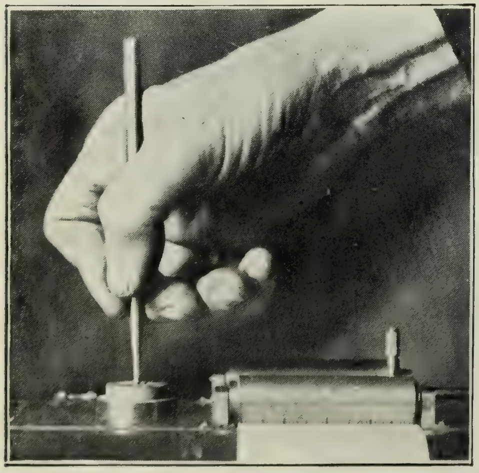


Fig. 17.



SELECTION OF PLUGGER POINTS AND MALLETS.

Plugger points exceeding seven-tenths of a millimeter in diameter seldom should be used for condensing cohesive gold. Much better density and more speed may be obtained by using large pieces of gold and a small plugger. It requires forty ten-pound blows of a mallet accompanied by fifteen pounds of hand pressure on a plugger seven-tenths of a millimeter in diameter properly to condense one-thirty-second of a sheet of gold. The ideal way to obtain this force is by a hand plugger with a hand mallet used by an assistant. The force is applied with the fingers holding the plugger in the pen grasp. (Fig. 15.) This hand pressure partially condenses the gold and holds the tooth tightly against the peridental membrane, so that, when the mallet blow follows, the tooth receives practically no shock, while the condensation is very deep and sufficient density may be obtained through much larger pieces of foil than by using any other method. With an automatic plugger, when the spring is screwed down tightly, from three and one-half to four pounds is required to release the spring, which represents the amount of hand pressure possible to be attained, and the resultant blow is from ten to fifteen pounds. It allows of accurate stepping, has good mallet force, but is sadly lacking in hand pressure, and is much slower in operation than the hand mallet.

Next come the electric and the engine mallet. The line of force and the blow can be admirably obtained with these mallets; they are also very speedy. No hand pressure can be applied, and their use is very painful. However, very good results are obtained by a few experts. They should only be used with small thin pieces of gold and very small plugger points.

The last and worst of all methods is the hand mallet used by the operator himself. This method has only the blow to recommend it. Very little, if any hand pressure is used, the method is painful, the stepping necessarily inaccurate, and the enamel margins are always in danger. It is a very exceptional operator who can use this method successfully.

INSTRUMENT GRASPS.

If an operator could cultivate a finger pressure strong enough so that he could exert from twenty-five to thirty-five pounds' pressure continuously through a large operation, it would not be necessary to use a mallet to condense gold foil; but only two or three men of whom we have any record have ever been able to do this. Gold foil cannot be thoroughly condensed with less force, therefore the majority of us are compelled to call upon the mallet for assistance, as the average operator is able to exert only from eight to twelve pounds' finger pressure repeatedly.

This lack of finger force is due to two causes—first, the almost universal use of an improper pen grasp (Figs. 16 and 17), and second the lack of practice with that grasp. I cannot too strongly urge upon every dentist the need of acquiring this grasp, and taking daily exercises in its use in his laboratory, until a sufficient amount of strength has been obtained so that he can use from fifteen to twenty pounds of force.

CONCLUSION.

In conclusion, I would emphasize the fact that there is nothing about the manipulation of gold foil that cannot be acquired by anyone whose natural gifts fit him for the practice of dentistry. To be successful all that is required is the very careful following of a certain technique in all of its details. Any short cuts or any compromises are almost always followed by failure. Anybody who will master the technique and have courage to follow wherever it leads him need never fear, for the results of his application will be amply satisfying.

[See also *Discussion*, as reported under "Proceedings of Societies," this issue.]

THE FUNDAMENTAL CAUSES OF DENTAL DETERIORATION, AND THE SUPREME AIMS OF DENTAL HYGIENE.

By **HOFRAT CARL RÖSE, M.D., Erfurt, Germany.**

[*Translation by the* Dental Cosmos.]

FOR every specialist in science it is of the greatest advantage to have his specialty scanned now and then from another point of view than his own, just as a group of mountain peaks can be more easily surveyed at a glance from afar. Many a detail which at close range seems very important loses in significance when seen at a distance, while, on the other hand, the real worth of one's own endeavor is best judged by the merits of kindred pursuits. Thus we dental hygienists should most heartily welcome the fact that about two years ago, no less an authority on anthropology than Otto Ammon expressed his views on our specialty in a short essay on the causes of dental deterioration among modern civilized peoples.* Ammon wrote this essay after studying my article, "Deficiency of Mineral Salts and Degeneracy."†

"PANMIXIA" THE MOST IMPORTANT CAUSE OF DENTAL DETERIORATION.

The results of my investigations are most favorably discussed by Dr. Ammon, and he acknowledges that soft water and foods deficient in mineral salts exert an untoward influence upon the structure of human teeth. He is fully justified, however, in regarding soft water as not the fundamental cause of dental deterioration, but rather as a predisposing secondary cause which may greatly enhance the unfortunate condition existing. Neither can the oral bacteria be the primary cause of dental deterioration, otherwise the predisposition to dental caries would not be so radically different in individuals of identical habits of life. Very close arrangement of the teeth will favor caries, undoubtedly, yet the greater development in the size of the brain in civilized man, and the corresponding reduction in the size of the jaws can again not be the primary cause of dental deterioration, for occasionally we find individuals with very crowded teeth which nevertheless are well developed and healthy. Phylogenetically, reduction in the size of the human jaw is compensated for by a morphological rudimentation, viz, simultaneously lesser development in the sizes of the teeth, and by an increasing tendency to eliminate the third molar and the upper lateral incisor. A denture thus reduced in size and number would really be no less well-developed than were those of our ancestors, if to us modern civilized men perfect dentures were as indispensable in the struggle for existence as with them. This is the starting-point of Ammon's discussion. He regards human "panmixia" as the chief cause of dental deterioration, saying:

> Panmixia is the opposite of natural selection, which latter teaches that favorable traits can be intensified from generation to generation, while undesirable traits can be eliminated. If a quality is no longer useful under altered conditions of life, the natural selection of that quality ceases spontaneously.

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* Dr. Otto Ammon, "The Sound Teeth of Prehistoric Man, and Modern Dental Deterioration." *Politisch-Anthropologische Revue*, July 1910.

† C. Röse, "Deficiency of Mineral Salts and Degeneracy." Berlin: J. Springer, 1908. (See also review in Dental Cosmos, January 1909, p. 135.)

> As it is, individuals of good and of bad parts are allowed to copulate promiscuously, and all their progeny, no matter whether it is desirable or undesirable, is preserved. This is panmixia and its effect. . . . Primeval man had to have good teeth in order to comminute and digest the food at his disposal. He was doomed as soon as he could no longer masticate properly. . . . The good teeth found in old skulls prove positively that primeval and early historic man needed good teeth. Natural selection never aims at more than is necessary. Nowadays, owing to the refinement attained in flour-milling, baking, and cooking, we have delicate bread and mushy food. Good teeth are no longer indispensable, for, when necessary, dentists are on hand to furnish us with substitutes, viz, artificial dentures with which we can masticate as well as with natural teeth. Panmixia has come to stay. When does a young man ever ask his fiancée if her white pearly teeth are natural or artificial? There is absolutely nothing to stave off the universal spread of dental caries. The indisputable explanation for this fact, the culprits responsible for the bad teeth of civilized modern mankind are—the cooks and the dentists! Röse will wonder!

But Röse is far from wondering!—for as early as 1896, fourteen years before Ammon, he voiced the very same opinions.* When writing the article in question, I was of the very same opinion as Ammon, and like Weismann and his followers, denied the direct hereditary transmission of acquired qualities. Accordingly I wrote in the paper mentioned:

> I do not believe that progenitors' lack of use of the teeth can directly produce a defective structure in the teeth of the progeny. But indirectly such lack of use contributes considerably to the dissemination of bad teeth. Even in wild animals defectively constructed teeth are observed now and then, due to individual variation. But such defects are probably very seldom transmitted by heredity. For most wild mammals, perfectly constructed teeth are the chief weapon in the struggle for existence—in other words, an absolute necessity. For that reason defectively constructed teeth due to individual variation are continually eliminated by natural selection. A tiger with carious teeth is a freak. In the propagation of mankind, however, good teeth are of more secondary importance. Owing to the artificial preparation of food, even individuals with bad teeth can obtain a fairly strong development. In man bad teeth cannot be eliminated by natural selection, since a bagful of money and a well-trained mind are of far weightier importance in the selection of mates than well-developed teeth. Bad teeth are therefore propagated in increasing proportion owing to panmixia. If good teeth were an absolute necessity for man for the mastication of coarse food, dental caries could never have become so universal. Individuals with bad teeth could no longer transmit their teeth to their progeny, but would become extinct owing to general deficiency in development. Hence, the lack of use which is based upon the artificial preparation of food is indirectly responsible for the further dissemination of poorly constructed teeth. . . . Panmixia as practiced by man, viz, the more or less complete elimination of natural selection in the struggle for existence, is the most important cause for the gradual deterioration in the microscopic structure of the teeth.

There can be no doubt that my findings of the year 1896 coincide fully with those of O. Ammon of the year 1910. During the sixteen years which have passed since, I have had ample opportunity to investigate a whole series of secondary causes of dental deterioration. In regard to the problem of heredity, I can no longer fully agree with Weismann. The heredity of acquired pathological qualities, at least, can hardly be denied any longer. But no matter whether one occupies the standpoint of Lamarck, Darwin, or Weismann, this much is absolutely certain—that the last and basic cause of dental deterioration is to be looked for in panmixia due to hyper-refined modes of living. Not only does the anatomic structure of the teeth themselves deteriorate, but also the salivary glands become less efficient owing to the lesser demand put upon them in the superficial mastication of soft food. Yet, well-developed salivary glands which secrete a strongly alkaline saliva are the most effective defense against dental caries.*

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* Röse, "Dental Caries in Military Conscripts in Bavaria." *Oesterreichisch-Ungarische Vierteljahrsschrift fuer Zahnheilkunde*, Vienna, 1896.

The much-dreaded suppuration of the dental alveoli, viz, pyorrhea alveolaris, is not only indirectly a consequence of panmixia, but is also directly due to insufficient mastication. An unused plow rusts!

THE DENTIST'S SHARE IN ENCOURAGING DENTAL DEGENERATION.

My logic would necessarily be poor if I had not come to O. Ammon's conclusion as early as 1896, viz, that we dentists also contribute to the further propagation of dental caries. At that time I did not make a public statement to this effect, because I did not wish to place untimely impediments in the way of the development of our dental profession. But now, since that thought has been expressed by disinterested third parties, it is "up to us" to remedy this unpleasant state of affairs. It is undoubtedly true that we modern dentists, in the same way as the medical men, benefit the living individual but check the sound development of the race, unless we combine all our energy to become also the guides of civilized humanity in the field of the hygiene of nutrition.

A nation which cares only for the living and neglects its serious duties toward the unborn progeny is doomed to perish. During the reign of Emperor Augustus he would have been ridiculed who would have chanced to assert that four hundred years later the most powerful political entity of history, the Roman empire, would be shattered to fragments. The modern culture of Europe and North America, with its increasing refinement of life, resembles only too closely the Roman culture during the time of the first emperors. Unless we learn from history, and with all our energy resist the increasing degeneration of the race, it will not take even four hundred years, perhaps, until in Stockholm a Tartar chief, in Berlin and Paris Asiatic vice-kings reside, while perhaps in Washington a negro or mulatto is enthroned as president. And then all our wonderful civilization will be forever buried with us. The Arian culture of Greece and Rome was superseded by the likewise Arian culture of the Germans, and underwent a renaissance. But when the last sound Arian tribe will have been annihilated and displaced by Asiatic or African hordes, who will then appreciate any longer a Homer, a Lionardo da Vinci, a Shakespeare, a Cervantes, a Goethe?

Relentless war against the increasing hyper-refinement of life; return to a simple and natural mode of living—that must become our dental slogan, lest we knowingly co-operate in the destruction of modern civilized humanity.

RESTRICTION OF PANMIXIA DEMANDED.

Disregarding a few occupational diseases, such as confectioners' caries, tooth decay is not a disease in itself, but, as cannot be too strongly emphasized, simply a specially plainly visible symptom of general physical degeneration—the gage, as it were, of human health. We educated dentists surely do not wish to be narrow technical artizans, but healers and helpers of humanity. For that reason we must think and act medico-biologically. Many a young girl with poor teeth would not, despite abundant financial means, be sought in matrimony, owing to her homely appearance, and would not propagate the predisposition to bad teeth, had we dentists not embellished her teeth. Many a young man with bad teeth and a simultaneous tendency to general degeneration had much better for both his own and for humanity's benefit, fall victim to a benign disease in his youth, or at least remain a bachelor, than, embellished by our art and barely kept alive, to enter into matrimony and procreate still more degenerate children, a burden to themselves and to others, and thus assist to depress the whole nation to a still lower level of degeneracy. We must absolutely emancipate ourselves from the idea of claiming as a triumph of our culture the effort to keep as many human beings as possible alive as long as possible by medical skill, regardless of how degenerate the individuals so preserved may be. In reality the working-out of this ideal is a curse for civilized humanity. To be sure, our Christian Germanic ideals of culture demand that we protect these poor degenerates from want. But by all conceivable means we must prevent them from propagating—if necessary, by legal restriction. In Catholic countries as many as possible of these physically degenerated, but morally intact individuals of both sexes should be induced to enter cloisters, while all strong and healthy individuals should be denied admittance. In Protestant countries a great number of similar cloisters or charitable foundations demanding the pledge of celibacy should be established.

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* Röse, "Dental Deterioration and the Quality of the Saliva." *Deutsche Monatsschrift fuer Zahnheilkunde*, 1905.

It is not my intention to enter in detail into the well-considered plans that have been frequently proposed by social economists and hygienists for rendering habitual criminals, lunatics, etc., permanently innocuous by the most humane methods. Neither will I discuss the blunder which is being committed in social hygiene by our present German social legislation, by regaling consumptives for a few months in well-managed sanatoriums, so that, after returning to their unhealthy homes, they may with renewed vigor procreate weakling children who in their turn are especially susceptible to tuberculosis. I would, however, devote a few words to the question of the hygiene of nutrition, which is the most interesting one to us dentists.

REFORMS IN HYGIENE OF NUTRITION IMPERATIVE.

Only meager attempts at reform have been made so far in this important field of hygiene. Nevertheless, when we review the last twenty years, there can be no doubt that in educated circles the appreciation of the necessity of natural and simple nutrition has increased most remarkably. A few enthusiasts in the hygiene of nutrition are even already entertaining visions of a far-reaching regeneration—of a higher development of the *genus homo* beyond its present norm—to be brought about by a rational hygiene of nutrition. My own optimism does not reach such heights; I opine that we ought to be content if, by summoning all our energies, we are able to bid a halt to that degeneracy which at the present time is advancing with giant strides. Nothing is more difficult to combat than the firmly rooted bad habits of masses of population in regard to nutrition. The combat is rendered doubly difficult from the fact that reform is opposed by the business interests of the highly capitalized purveying agencies. This is the case, unfortunately, in the important field of the bread supply in Germany. Since the year 1893 I have, time and again, by mouth and pen preached the return to the fully baked, thick-crusted, whole-grain bread which our ancestors ate, and during recent years Dr. Kunert has proved a most energetic fellow combatant; but our practical results have so far been very small, since the bread industry, especially the wholesale trade, withholds its aid. The spongier and softer bread is, the more water it contains, the cheaper can the price per kilogram be fixed. Well-baked bread which contains less water cannot be sold as cheaply as the product now in vogue. Unfortunately the large majority of our German population, in purchasing their victuals, look for bulk instead of quality. A baker who would attempt to sell well-baked, thick-crusted, whole-grain bread at the same price as the watery, soft, thin-crusted bread now in vogue in Germany, would surely fail. Under these conditions, who can blame the bread trade for disregarding our reform ideas, for the present at least? Patented whole-grain flours such as "Schlütermehl" and Finkler's "Finalmehl" are willingly introduced by bakers despite the expensive patent and license royalties, because they are capable of absorbing a great deal of water, therefore "go much farther" than other flours.

BREAD REFORM ADVOCATED.

Fully baked, thick-crusted bread such as we advocate for the benefit of human health in general and of the teeth in particular, probably can be re-introduced only if dentists, physicians, and teachers continually harp on this subject. We bread reformers are far from wishing to increase the cost of living; on the contrary, we wish to reduce it. The German people, for instance, could easily get along with half the quantity of expensive meat as consumed today, if, instead of the customary innutritious and tasteless soft bread, they would eat thick-crusted, fully baked, whole-grain bread or Swedish hard bread, and masticate it thoroughly. Thorough mastication is one of the most important hygienic measures, not only as being of advantage for the teeth, but from its benefit to the health of the whole human system. And for that very reason our daily bread must be hard and thick-crusted, in order to force the individual to chew most vigorously. In districts which are deficient in mineral salts and where dental conditions are generally poor, adults might perhaps eat the soft part of the bread only, or soften the crust in some beverage. Children, however, should by all means be given hard bread as early as possible, in order that their teeth and salivary glands may develop as well as is at all attainable consistently with their inherited physical make-up. I must repeat: "He who saves the teeth of his children by giving them soft foods, saves them for the dentist's forceps."

INCREASING CONSUMPTION OF SUGAR A CAUSE OF GROWING DENTAL DEGENERATION.

Another important cause of the increasing degeneration of the white race is the increasing consumption of sugar in the shape of cakes, chocolate, and candy of all sorts. True enough, the child's natural instinct demands sweetmeats, but in the form of grape sugar (glucose) as contained in fruit. If the masticatory function is sufficient, small additions of cane and beet sugar do little harm, as this form of sugar is changed to glucose by the saliva. But where is the modern child who masticates sweetmeats, such as chocolate and others, until this chemical change has taken place? He who loves his children should daily give them fruit, cocoanuts, sugar-cane, if possible fresh, or else preserved or dried, and should himself freely partake thereof.

SOFT DRINKING-WATER A CAUSE OF DENTAL DEGENERATION.

The third cause of the degeneration of the race, viz, the soft water in our industrial districts, large cities, and mountain regions, is far more difficult to eliminate, at least among the overwhelming majority of the poor, who cannot afford the daily luxury of table-water containing a large percentage of mineral salts. Perhaps this lack of mineral salts can be made up in some other and cheaper form. Out of this difficulty, too, I hope to find a way that shall be feasible not only in theory, but in practice as well.

MEASURES FOR ENFORCING NATURAL SELECTION ADVOCATED FOR THE ERADICATION OF DENTAL CARIES.

We now come to the last, but at the same time most difficult problem of dental hygiene, without the solution of which all the other measures will be but a drop in the bucket. We must try to overcome panmixia, and to replace the defective natural selection in man by rational natural selection. The most degenerate individuals with poor teeth must be prevented from marrying healthy mates with good teeth by most considerate, but none the less most firm, unyielding measures. If a perfectly strong and healthy man has had the misfortune in his youth to lose a leg, everybody finds it natural that he remain unmarried and die childless, although from the standpoint of race hygiene there is not the least objection against such a one-legged man marrying. An individual with poor teeth, however, will invariably beget children with poor teeth, so that against his marrying the gravest hygienic objections exist. It cannot be repeated often enough that bad teeth especially are, as a rule, simply a partial symptom of general physical degeneration. The most radical remedy would be, of course, to forbid such degenerates with specially poor teeth to marry, as is done with all other pronounced degenerates. Whether we civilized nations of the white race will be able to rouse ourselves in time, before it is forever too late, to such rational and radical measures of race hygiene, who knows? In the middle ages this was possible. Leprosy was in those days completely exterminated in that way. In several states of the American Union a medical health certificate is lately being demanded before matrimony. Hail these youthful, determined Americans! Have we European peoples really become so senile and unenergetic that we are unable to follow the lead of our cousins across the sea?

For the present, to be sure, my severe demands will cause many to shake their heads. A certain faction of the public press which is thriving best on the lowest stratum of degeneracy will probably launch its bitterest sarcasm against me. And yet our race will rally and follow me, or will irredeemably sink into the abyss of degeneracy and make room to mentally inferior but physically stronger peoples. There is no middle course. The world's history teaches an unmistakable lesson.

It is, of course, far from my intention to prevent the great mass of young people with moderately bad teeth from marrying. I refer exclusively to those dentures which are hopelessly beyond repair and the masticatory function of which cannot be preserved even by the most careful dental treatment and most conscientious oral hygiene. In the meantime, as long as the public authorities cannot interfere, the more highly educated classes of society, at least, should think of measures for self-defense. To small children it must be explained time and again that healthy and well-preserved teeth are a priceless heritage which amply compensates for the lack of other advantages, such as large fortunes, etc. If the child's mind is imbued with reverence for sound teeth, he will surely, later on, in selecting a mate, place greater value upon good teeth than has been customary heretofore. It must be explained to the children that those of their playmates who have bad teeth are poor, pitiable cripples who should be treated with consideration. The parents of a child with very poor teeth should on their own account try to discourage as much as possible their offspring from matrimony. If these poor degenerates are bound to marry nevertheless, then they should select their equal. Their marriage would then frequently remain childless, voluntarily or involuntarily, or they would be naturally extinguished in the succeeding generation owing to lack of progeny. But it is an unpardonable, a mortal sin against race hygiene when a physical or mental degenerate, through his financial means of other social advantages, lures a strong and healthy partner into matrimony, and thus adds to the further racial degeneration of the whole nation. In such cases, to be sure, an occasional child will inherit the healthy parent's make-up. Frequently, however, the union with a degenerate weakling remains without issue, and the healthy parent is thus prevented from the propagation of normal descendants. At all events, the degeneracy of the one parent, even though occasionally it may not appear in the children, will manifest itself again in the grandchildren. For not only the wilful iniquities of the fathers, but their nonculpable degeneracy also is visited upon the children unto the third and fourth generation. With this fourth generation, at the latest, a family which has a degenerate weakling for ancestor, becomes extinct, as a rule. There is no escape—we are confronted with cruel, but unalterable facts. The downward tendency can hardly be fully eradicated now; degeneration marches on with seven-league boots, while rational rejuvenation advances at a snail's pace. A degenerate who is unwilling to bridle his selfishness so far as to renounce progeny voluntarily will inevitably incur the risk of having his own children and grandchildren curse his memory.

THE DENTIST'S MISSION.

In the daily papers the question has recently been discussed why the Albanians are such an extraordinarily healthy and strong people. A high Albanian dignitary, Mehemed Ali Pasha, is said to have discovered the cause therefor in that there are no physicians among the Albanians! For that reason, he claims, the law of natural selection still prevails there, and only the strong and healthy Albanian survives. But why are no physicians in Albania? Because the population is poor, and in their limestone mountains lead a very healthful and moderate life, free from alcohol. In the limestone mountains of Bosnia, also, we find very tall and strong people with glistening teeth and indelible health. Suppose these sound peoples were transferred to the mountains of Silesia or Saxony, deficient in limestone, condemned to work in factories, and given innutritious white bread to eat, or fed with delicate meat dishes in large cities the water supply of which is deficient in mineral salts; in a hundred years the Albanians too would have degenerated and would require physicians. Physicians and dentists are like the tubercle bacilli or the bacteria of dental caries—they are harmful to a civilized nation only after natural degeneration in consequence of panmixia has advanced to some degree. They are not the basic cause, but only promoters of previous degeneration due to hyper-refined modes of living. But physicians and dentists need not necessarily promote the advance of degeneration, which they in part undoubtedly do today. On the contrary, they can stem the rising tide of degeneration, if the public authorities invest them with power to do so. Then, of course, physicians must no longer be frankly tradesmen who cure disease simply for coin. Physician and priest should really be one person, as was the case in many ancient civilized nations, and among the Germans up to the early middle ages. Then, instead of a minister, there would be established in every village a medically educated priest who would have the spiritual as well as the physical welfare of his flock at heart, and whose principal aim it would be, not to cure disease, but to prevent disease and ward off the increasing degeneration.

Since this most practical combination of physician and priest in one person can probably no longer be realized in most countries, nothing is left but to appoint physicians and dentists as officials, as publicly employed health inspectors. In Germany we are apparently on the road in this direction of development. The remarkable development which German social legislation has undergone can hardly proceed in any other direction. But even these health officers appointed by the state or the municipality will be unable to prevent the increasing degeneration and the ultimate doom of the white race, unless the public powers give them authority to practice rational race hygiene, to prevent the propagation of the most seriously degenerate subjects by interdicting their marriage, and to inhibit the further progress of degeneration by the introduction of a rational hygiene of nutrition.

ORAL SEPSIS FROM THE PHYSICIAN'S STANDPOINT.

By JUDSON DALAND, M.D., Philadelphia, Pa.,
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(Read before the Pennsylvania State Dental Society at its annual meeting, Pittsburgh, Pa., June 12, 1912.)

THE importance of the mouth as a focus of infection was first impressed forcibly upon me by the remarkable work of Dr. W. D. Miller in 1891, since which time I have always kept this possibility in mind. He clearly demonstrated that not only suppurating mouths, but also supposedly normal mouths contain a large variety of micro-organismal life; and that not infrequently pathogenic organisms, such as streptococci, staphylococci, and pneumococci, are also present. It is therefore possible for diseased, as well as apparently normal mouths, to act as foci for systemic infection. Dr. Miller injected the secretions of my mouth, which were presumably normal, into a mouse, causing streptococcus peritonitis, terminating fatally in twenty-four hours. Naturally, when pyorrhea, dental caries, or alveolar abscesses are present, infectivity is increased, and that serious disease is not more frequent is a tribute to the extraordinary immunity possessed by most individuals.

INDIFFERENCE OF THE MEDICAL AND DENTAL PROFESSIONS TOWARD THE SYSTEMIC DANGERS OF ORAL SEPSIS.

This subject is so large that I shall limit myself to a *résumé* of my own experience during the past twenty years. It is more than probable that many diseases, the causes of which are unknown, may be primarily due to an infection from a mouth obviously septic or apparently normal, and it is certainly true that in many diseases where the source of the infection is unrecognized, the portal of entry is by way of the oral cavity. The failure to recognize the importance of mouth infection in systemic disease is due primarily to ignorance. Many physicians are skeptical as to the reality of this danger; others are careless and, beyond inspecting the tongue, seldom examine the oral cavity. I incline to the opinion that this strange mental lethargy also exists in the dental profession. I am forced to this conclusion by the indifference of dental surgeons when this matter is discussed. If they were keenly alive to the possible seriousness of septic mouths, they would not only promptly remove the disease, but also advise the medical attendant of its occurrence. Many physicians, on the other hand, fail to appreciate the possibility of serious disease being induced by mouth infection, because of the erroneous belief that it is trivial, unimportant, and belongs solely to the domain of the dental surgeon. That the dental profession in general is equally criminally careless is also evidenced by their permitting septic foci, of which they have knowledge, to remain in the mouth for weeks or months.

MANY OBSCURE DISEASES PROBABLY DUE TO ORAL SEPSIS.

Although I cannot present conclusive evidence in support of that which I am about to state, I am convinced that a very large number of ill-defined, undiagnosed illnesses of varying severity are due to sepsis originating in the mouth. I am also convinced that the cause of that clinical picture known as the pretubercular condition is often oral sepsis. Irregular or intermittent, slight or moderate septicemia, oral in origin, would, if duly recognized, not only make clear the cause of the beginnings of many diseases, but would also point the way to cure and prevention.

DISEASES UNDOUBTEDLY DUE TO ORAL SEPSIS.

The occurrence of an infection of the antrum of Highmore from an abscess at the root of a tooth the apex of which penetrated the sinus, osteomyelitis of the upper or lower jaw, the involvement of the lymphatics draining the infected area, thus producing adenitis and glandular tumors, or the involvement of the parotid or other salivary glands from mouth sepsis, are not unusual. It is, however, less easy for many dentists and physicians to comprehend that the occurrence of acute or chronic polyarthritis is one of the commonest expressions of oral sepsis. Any joint may be infected, and the process involves not only the periarticular structures, but also the serous membranes of the joints and the tendons. As the teeth may be looked upon as possessing joints, it is not impossible that these organs may be infected systemically, even though the primary focus may be in a tooth in the near neighborhood. Acute attacks of severe septicemia with polyarthritis have been for years, and still are, diagnosed as acute inflammatory rheumatism. The pathogenic organisms may lodge in the periosteum or ends of the bones, producing that crippling and incurable disease known as arthritis deformans or rheumatoid arthritis. In certain cases, doubtless, the sheaths of the muscles are principally involved.

CASE OF PYORRHEA COMBINED WITH SEPTICEMIA AND PYEMIA.

It is generally supposed that pyorrhea alveolaris cannot produce septicemia, and this opinion was expressed in a recent contribution to the subject by a member of the dental profession. In the following case of pyorrhea both septicemia and pyemia were present:

Case I. The patient, a male, fifty-three years of age, married, tailor by occupation, with unimportant family and previous personal history, had had pyorrhea for ten years. The present illness began four years ago, when boils appeared between the scrotum and anus and subsequently on the neck, legs, and trunk. The boils were associated with carbuncles, many of which were small, and others large. Some of the carbuncles were so large that the central core, when discharged, would leave a cavity of the size of a silver quarter or a hen's egg. The patient counted one hundred and eighty boils and carbuncles in four years, and his sufferings were so severe that his hair became prematurely gray, and suicide was contemplated. Examination of his blood showed erythrocytes 70 per cent. and hemoglobin 55 per cent. The urine was normal. Physical examination showed emaciation, arterio-sclerosis, moderate left ventricular hypertrophy, mitral insufficiency, and a pericardial friction sound, probably due to a depressed ensiform. The body was covered with numerous scars, showing the location of previous boils and carbuncles.

A number of boils and carbuncles were present, and one located in the right iliac region was suppurating. Pus obtained from this source and examined by Dr. H. M. Whiteway showed the presence of polynuclear leucocytes, erythrocytes, and cocci in pairs and groups. Examination of the deposit removed from the teeth showed it to be of chalky consistence, and varying in color from yellow to yellowish green. It was easily removed and showed the presence of uric and lactic acids, large amounts of phosphates and lime, a moderate amount of oxalates, and a trace of chlorids.

The patient was referred to Dr. Charles E. Pike of Philadelphia, who made the following report:

"I have examined your patient and find extensive suppurations around at least six of the teeth. Two of these I think are amenable to treatment, but four should be removed at once. While the case presents some difficulties, I think dentures could be supplied which would materially improve mastication. No appliance could be considered as permanent until thorough absorption has taken place. This may require from two to four months. In the meantime temporary plates could be worn with advantage."

Two months later a small boil appeared about three inches above the popliteal space, and one carbuncle appeared three months later. With these two exceptions, no boils or carbuncles appeared during thirteen years, during which time the patient has been in excellent health.

This case illustrates that pyorrhea may produce pyemia extending over a period of four years, and that the removal of the pyorrhea caused the permanent disappearance of the boils and carbuncles, as no specific or local measures were employed, and the only drugs the patient received were calomel, phosphate of sodium, hydrochloric acid, and pepsin.

Although, as far as is known, suppuration was confined to the skin, it is inconceivable that, in four years, the only tissue of the body infected should be the skin. I am of the opinion that profound pathological changes occurred in various organs and parts of the body, and that a part of the extreme chloro-anemia was due to this cause, as was also the moderate thickening of the arterial walls, due to chronic endarteritis, septic in origin. It is surprising that this patient showed no involvement of the joints and heart.

The second case illustrates a fatal result of mouth infection, happily of rare occurrence, although no knowledge exists as to its percentage of frequency. It is doubtless a less rare cause of septic endocarditis than is believed, as yesterday a similar case was referred to me by a colleague.

FATAL CASE OF SEPTIC POLYARTHRITIS, ORAL IN ORIGIN.

Case II. The patient, a male, forty years of age, showed the classical evidences of septic endocarditis, involving the mitral valve —*i.e.* tachycardia—mitral regurgitant murmur, exceedingly feeble muscular element of the first sound of the heart; intermittent and recurrent fever, frequently associated with sweats. A blood culture made by Dr. Nathaniel Gildersleeve showed streptococcus infection. Later polyarthritis developed, and death occurred in six months from the onset of the first symptoms. The only etiological factor discoverable was the presence of pus at the roots of the molars of the lower jaw, which had been neglected for several months. During the course of the disease from time to time, one or more joints showed the usual manifestations of inflammation.

That this incurable and necessarily fatal disease was produced by a cause so easily removed, demonstrates that prompt diagnosis and treatment would have been life-saving procedures. This case also illustrates the predisposition of septic mouth conditions to localize themselves in the neighborhood of joints, and I am firmly convinced that many so-called cases of acute articular rheumatism should be diagnosed as septic polyarthritis, oral in origin.

SEPTIC PULMONARY INFARCT.

Case III. [Dr. Ellsworth Smith's case.]

That a septic pulmonary infarct may arise from the mouth has been referred to in a communication read by Dr. Ellsworth Smith of St. Louis before the Section on Medicine at the last meeting of the American Medical Association. This complication followed cauterization of the floor of the mouth.

CHRONIC INTERSTITIAL NEPHRITIS, UREMIA, AND FAILURE OF CARDIAC COMPENSATION.

Case IV. The patient, a female, thirty-eight years of age, with a family and medical history unimportant in this connection, had carious and filthy teeth, many on a level with the gingival margin. There also existed a well-marked pyorrhea. There was debility, nausea, vomiting, headache, edema of the lower extremities; albuminuria and cylindruria; insufficient excretion of urea, hemorrhagic retinitis, arterial sclerosis, left ventricular hypertrophy, mitral insufficiency, extreme hypertension, systolic blood pressure 258 mm., diastolic 198 mm., establishing the diagnosis of chronic interstitial nephritis and uremia and failure of cardiac compensation. There was also extreme chloro-anemia, the erythrocytes numbering 66 per cent. and the hemoglobin showing 45 per cent. Although the etiological factors were multiple, the condition of the mouth, which had existed for many years, was looked upon as the most important contributory cause of the condition described.

DEGENERATION OF ARTERIES.

Case V. The patient, a male, forty-eight years of age, had an unimportant family and medical history, excepting for the occurrence of alleged rheumatism eight years before. He entered the hospital suffering from precordial pain and dyspnea on exertion. Physical examination revealed arterial sclerosis, dilated aorta, dilatation, and hypertrophy of the left ventricle, mitral insufficiency, degenerated myocardium and arrhythmia. Dr. William J. McKinley reported that the teeth in both the upper and lower jaws were carious, and that pyorrhea existed about the four lower incisors, and recommended the extraction of all the roots and teeth in the upper jaw, and of all but six teeth in the lower jaw, as well as treatment for the pyorrhea. The condition of the mouth, which had existed for many years, was, I believe, the most important contributory cause of the degeneration of the arteries.

Although the clinical evidence of these two cases does not permit of the statement that oral sepsis was the sole cause of the cardio-vascular and renal changes, this association occurs so frequently, more especially in hospital practice, that I am of the opinion that it plays a very large rôle in the production of these pathological changes. Many of these cases present a variety of causes, acting at times separately and at times simultaneously, all tending to lessen immunity or cell resistance; so that moderate septicemia, more especially if continued over a period of years, could easily be responsible for a large share in the production of degeneration in the arterial walls, the heart muscle, and the kidneys.

CHOLECYSTITIS AND CHOLELITHIASIS.

Case. VI. The illness of this patient, female, twenty-two years of age, married, with unimportant family and previous medical history, began four weeks before admission to the hospital with colicky pains in the right side of the chest, aggravated by deep breathing and cough; later the pain was localized in the lower sternal region, and followed by jaundice. Physical examination showed jaundice, pain on pressure in the upper half of the abdomen, slight radial fibrosis, carious and crooked teeth, and pyorrhea. A diagnosis of cholecystitis and cholelithiasis was made.

While absolute proof is wanting, a causal relationship between the mouth condition and that of the gall-bladder, by infection, is more than probable. The clinical evidence in this case is not conclusive, but I agree with the opinion held by a large number of authorities that pathogenic organisms in a septic mouth, when swallowed, in certain cases may cause septic gastro-enteritis, cholangitis, or cholecystitis.

LATENT DISEASE-CARRIERS HARBORED IN THE MOUTH.

We know that a small percentage of individuals who have had typhoid fever, even though they be in excellent health, may have typhoid bacilli in the alvine discharges for years after the disease has disappeared. These so-called typhoid-carriers may thus cause endemics of this disease. In a somewhat similar manner, certain individuals, apparently in good health, may carry in the mouth pathogenic organisms such as streptococci, staphylococci, pneumococci, or the diphtheria bacilli.

The recognition and removal of oral septicemia is of importance prior to undertaking any major surgical operation, since this condition is apt to convert serous exudates into pus.

RELATIONSHIP OF PUTREFACTIVE ORGANISMS IN THE MOUTH TO NUTRITION.

Time does not permit of references to the relationship of a septic mouth to the affections of the nervous system, to diseases like diphtheria, syphilis, etc., nor its transferrence to a dental surgeon or his patients by instruments. An important subject for future consideration by dental investigators would be the relationship of putrefactive organisms in the mouth to nutrition. These organisms, by causing decomposition and fermentation of foodstuffs, with the production of toxic substances, when absorbed, induce the protean manifestations of so-called intestinal toxemia.

PROPHYLAXIS URGED.

Although we know that oral sepsis exists for weeks or months without obvious detriment to the bodily health, we also know, from the evidence presented, that in certain cases impairment of health, serious crippling lesions of important organs, or death may ensue. It is therefore the duty of the dental and medical professions to join hands in recognizing promptly and treating efficiently all septic conditions of the mouth, and also to give close attention to that all-important question—prophylaxis.

[See also *Discussion*, as reported under "Society Proceedings," this issue.]

MODERN DENTISTRY IN GERMANY.

By N. S. JENKINS, D.D.S., Loschwitz, Dresden.

(Read before the National Dental Association, in general session, at its annual meeting, Washington, D. C., September 10, 1912.)

IN response to the flattering request of your president, I beg to present a few observations upon Modern Dentistry in Germany, as being a subject of especial interest at a time when our profession is everywhere exercising so wide an influence and attaining such great importance.

The characteristics of every nation are displayed in its contributions to science. No one people has a monopoly of research, of clear deductive reasoning and of practical application of knowledge, but each works in its own way according to the inspirations or the limitations of its temperamental, social, and educational conditions, and the combined results of all are for the enlightenment and the healing of the world. Just so far as the nations "foremost in the files of time" understand each other, so far is advanced the doom of narrow jealousies, the growth of mutual admiration and respect, and the triumph of the arts of peace over the arts of war.

EPISODES IN THE DEVELOPMENT OF MODERN DENTISTRY.

"Modern dentistry" is not quite easily defined. It does not simply exist in Miller's epochal explanation of a rational theory of dental caries, nor in the prodigious growth of technical devices, which have so greatly aided in developing prosthesis and orthodontia and made the restoration of lost dental tissue by porcelain and gold inlays a comparatively easy task. Neither does it consist in the discovery of general and local anesthesia, through which the sufferings of patients have been so largely ameliorated and the field of conservative operations has been so widely extended; nor in the revelations of the Roentgen ray; no, not even in the splendid triumphs of bacteriology, whose contributions to our knowledge and resource are but an earnest of what is to come. All these, and much more, are but episodes in a development so fundamental, so rapid, so practical, so wide-reaching, so beneficent, so inspiring, that the observer from the former generation can but exclaim, "Behold, all things have become new!"

THE STATE UNIVERSITY AS THE CRADLE OF MODERN GERMAN DENTISTRY.

In Germany, modern dentistry may be said to have had its beginning with the foundation of dental institutes in 1884, at the Universities of Leipzig and Berlin, the year of the twenty-fifth anniversary of the Central Verein Deutscher Zahnärzte. This beginning was the result of a long campaign patiently and persistently waged by the early German dentists who, loyal to their traditions, believed that true progress could only be made through establishing university schools. In America, where, as the Carnegie Foundation for the Advancement of Teaching asserts, a large number of private medical schools still exist, and where the first college of dentistry was obliged to become an independent institution and wrought its great work without connection with a university, this steadfast conviction may not be perfectly understood.

In Germany the whole system of education is under the control of the state, and constitutes a pyramid of which the university is the apex. For five centuries it has been a citadel of the "republic of letters." Born at the close of the middle ages, flourishing under the emancipation of mind in the Reformation, surviving the thirty years' war as almost a unique example of what was best worth preserving out of that disastrous struggle, nourishing a love of liberty from the beginning of modern history, keeping alive the national spirit in times of deepest political and military humiliation in full hope of ultimate triumph, the university has continuously cherished and displayed the best qualities and gifts of the German character. The universities have been the hope of the people. Any German, however humbly born, might hope to become, if gifted and industrious, a learned man, and might even aspire to become a professor, one of the few positions which indicated personal worth and not favor.

With each step in emancipation from the foreign yoke, every little state became ambitious to have its own university, as the sign and symbol of the higher intellectual life and the means of exalting its own importance. Not only has the university been the source of training from which have sprung a splendid literature and renowned philosophies, but out of the universities, and their kindred technical schools of equal rank, have come the triumphs of German science and the wonderful achievements of German medicine.

It was therefore inevitable that there should have seemed to our German colleagues but one way to found schools of instruction for dentists. The state, and the state alone, would be sufficiently wise, disinterested, and powerful to supply the appropriate instruction and to regulate the conditions under which it should be given. It could only be through creating a new department in the universities, by adding three sections to those already existing; and thus would be developed a new branch of medicine. To convince the authorities that such schools were necessary was a long task, and when at last they were reluctantly convinced, their response was not immediately impetuous. It was the theory that a dental institute should be organized and supported by the state, but this was not at once accorded. The earlier institutes were organized by instructors appointed by the state and who generally received the title of Professor, together with a small subvention. The beginners were obliged to content themselves with modest facilities and to exercise the most rigid economy in order to make their meager supply of money go as far as possible; but they were men of determined character, patient, unselfish, hopeful. Tomorrow was to be theirs. They were striving for full recognition and generous support, and were not to be discouraged if the way were long, for they knew their system was founded upon the true interests of society and consistent with the cherished methods of education.

Leipzig affords the best example of the slow but certain progress toward the desired result. At first the dental institute was only slightly attached to the university. It required fourteen years, from 1884 to 1898, before it was finally taken over by the state and incorporated into the medical faculty. All the dental institutes in Germany have gone through, or are at present going through, the same process, and three of them, Leipzig, Würzburg and Berlin, have at last obtained splendid new edifices, which are among the best examples of convenience and appropriateness of arrangement and are built in the lordly way which characterizes German governmental undertakings. The theory has been that every dental institute should have three departments, namely, surgical, operative and technical, each with a professor at its head and with the necessary number of assistants. As yet, however, only four institutes conform to this ideal—Berlin, Breslau, Munich, and Leipzig, and in Leipzig the surgical and operative departments are temporarily united.

But the long battle has been won. In a condition of greater or less development, the dental institute has found a home in the German universities. Recall these universities in the order of their seniority, from 1396 to 1872—Heidelberg, Würzburg, Leipzig, Bostock, Tübingen, Greifswald, Königsberg, Jena, Giessen, Kiel, Halle, Göttingen, Erlangen, Münster, Berlin, Breslau, Bonn, Munich, Strassburg. What a majestic roll! What memories of ancient learning, of courageous seeking for light in abounding darkness, of creations of spiritual and material beauty, of the diffusion of enlightenment and the relief of human misery come to us in the mere mention of these great names! Dentistry is now adding to their glory. What a triumph for our young profession that in all of them but two, dentistry has found an abiding-place and has opened a new chapter in its history.

EDUCATIONAL REQUIREMENTS AND CURRICULUM.

Has German dentistry been, and will it continue to be, worthy of its opportunities? From the first a standard of preliminary education equal to that of graduation from one of the best of our high schools was demanded for matriculation, but three years ago the government raised the standard to the passing of the maturity examination of the gymnasium, as is required for commencement upon the study of the other professions in the university. At the same time the course was extended from six to seven semesters, three less than is required for the medical degree, and equal to three and a half years, before the dental student could be graduated. The course of study is severe and the requirements are not to be evaded. All students must begin with work intended to train the hand. During the first two semesters, besides devoting themselves to physics, chemistry, anatomy, physiology, and lectures upon prosthesis, they must work seriously in metals and at carving in ivory, then in metal plate work and only last at the simpler technique of vulcanite. At the end of the year they must pass a thorough examination, or be set back for half a year. Throughout the whole course, which increases in demands with every semester, the students are kept closely occupied, and yet, so eager are they to make the most of their opportunities, that many of them find time for attendance at the lectures and clinics upon subjects in the extensive borderland of dentistry.

The advantage of accepting only students who have ripened and systematically trained minds is very great. Such students more quickly master the principles and more readily acquire the necessary dexterity in practical work than those of inferior discipline, in spite of their more advanced years. Physicians who turn to the study of dentistry not too late in life, often display remarkable ability in practical work. Women, who constitute perhaps ten per cent. of the students, seem to possess even more patience, industry, and ambition than the ordinary male student, and they usually pass the final examination with especial credit in the theoretical and scientific branches. They have proved to be, by reason of their patience, gentleness, and conscientiousness, peculiarly adapted to the trying work of the school dental clinics, and will doubtless play an indispensable part in the development of this immensely important work.

PRESENT NUMBER OF GERMAN DENTISTS.

In 1883 there were in Germany only four hundred and fifty-one dentists who had passed the examination of their time. There are now between three and four thousand well-educated practitioners, who are for the most part doing excellent practical work, and some of them are exceptionally able operators.

PERSONNEL OF TEACHING STAFFS.

It was inevitable that the German dental institutes should, from the beginning, lay great weight upon fundamental scientific training. It was not their business to make merely skilful operators; that could be done with uneducated men. Their task was to raise dentistry to a learned profession, to place upon the graduate a hall-mark of which he should be proud, to fit succeeding generations of dentists to be equal to the emergencies of their time. In their task they were aided by American experience. Some of the instructors were American graduates, among whom the revered Miller was the light, not of Germany alone, but of the world. It was, however, only among themselves that they could hope to find the men permanently adapted to their purpose, and these have been found by the natural process of evolution. In every direction their influence is great.

POSTGRADUATE COURSES.

An interesting example of the way the state and dental instructors may work together for good is found in the establishment of the postgraduate course in Berlin ten years ago. It was felt that the progress of dentistry was so rapid that the older practitioners were in danger of being left behind, and therefore it was determined that a school should be established, partly supported and directed by the state, to afford such practitioners gratuitous opportunity to become acquainted with modern theories and methods by lectures and thorough instruction in practical work. This school was established in Berlin and continued holding two courses in the year, one in summer and one in winter, of from four to six weeks each. Its usefulness was so evident that it was found necessary later to extend its work by establishing local courses of six days each in the smaller towns of Prussia. The order and efficiency which characterize this enterprise, and the unselfish devotion of the eminent men who have taken part in it, are beyond all praise.

REMARKABLE PROGRESS OF PUBLIC DENTAL HYGIENE.

Perhaps the most striking illustration of the influence of modern German dentists is found in the progress of public dental hygiene during the past ten years. The first school dental clinics were established in Strassburg and Darmstadt in 1902. There are now one hundred and twenty clinics in Germany where the children of the people can be treated, and this is but the beginning in a campaign designed to revolutionize the physical and moral condition of the nation. It is a stupendous task, but it is being carried out logically and progressively. It seems indispensable in Germany to undertake any great work only upon a definite plan founded upon a plausible theory. In this case the theory is that the municipality, which has charge of the lower schools, owes it to the state to care for the teeth of poor children. Experience shows that this can be done more effectively and more cheaply in this country—where politics is absent from municipal government, and where none of the public money is lost or squandered—through the municipality rather than through private means. Of course there are here, as elsewhere, differences of opinion. There are some jealousies and much ignorance and inertia to be overcome, on the part of the magistracy as well as on the part of the people, but the theory is sound, the devotion of its champions is heroic, and complete ultimate triumph is inevitable.

GERMAN DENTAL LITERATURE.

Germany is particularly rich and prolific in dental literature. The German temperament and education leads naturally to research and to literary expression of a high order, which is aided by the richness and flexibility of the language. The last quarterly report of a Berlin publisher announces some twenty-five new dental publications, all of them of interest and importance. I cannot too earnestly recommend American dental students to study German, and thus open for themselves access to a professional literature of great value. America would also largely profit were German dental works as frequently translated into English as American and English works are translated into German.

In Germany the dental professor advises and expects the student to pursue his course of dental study in more than one university, in order to broaden his vision and experience. This admirable custom should become international.

SPECIAL BRANCHES IN WHICH GERMAN DENTISTRY EXCELS.

The list of branches in which German dentists have made striking progress is too long for detailed mention. In every department of oral surgery they are superb. They are famous in the surgical treatment of chronic periodontitis and for the replantation of teeth which have had chronically diseased roots. This latter is a common operation among German dentists, even in small circles of practice, and is attended generally with favorable results. In local anesthesia, regional and neural, founded upon minute study of the anatomy of the jaws, they are unsurpassed. In the technique of Roentgenology, intra and extra-oral, and in the resulting correctness of diagnosis in abnormalities and diseases of the teeth and jaws, they are unequaled. They have improved the systematizing of orthodontia and cultivated a sounder judgment in this field by their studies in etiology, and made great advance in bringing into place unerupted teeth by surgical and orthodontic means, and they have also greatly advanced the surgical prosthesis of fractured jaws. They have improved the technique in casting inlays and bridges, as well as in making porcelain inlays. They have refined the methods of local operative treatment in pyorrhea, and invented ingenious and practical methods of splinting teeth loosened by this destructive disease. Their researches in oral bacteriology and their investigation of such subjects as the relation of the thyroid gland to the development of the teeth are indications of the sort of work especially congenial to the mind of the German scientist, and in which he achieves such great results. It is partly temperament, partly education, partly social conditions, from which the German derives this characteristic ardor for abstruse investigation. He loves the pursuit of knowledge, not simply because it brings power, but also because of the richness and splendor which it gives to life.

EXCHANGE OF TEACHERS URGED.

American intellectual activity, with its strong bent toward immediate practical results, is likewise affected by environment. The direction of our achievements has been determined by the necessity of redeeming a vast continent from savagery and preparing it for a new type of civilization. The German asks, What does a man know? We ask, What can a man do? We greatly need to more completely understand each other. In dentistry, as in other branches of learning, we should establish an exchange of professors for mutual enlightenment and advantage.

MEDICAL COURSE FOR DENTISTS UNPOPULAR.

In Germany, as in America, there appears to be no general enthusiasm for insisting upon a full medical course for dentists. It is believed that the system of instruction is now so broad and thorough that the three extra semesters required for the medical degree are not essential. It is, however, felt that a special Doctor title should be given to dentists, as is the case in America, and this desire will probably soon be fulfilled.

STATUS OF AMERICAN DENTISTS IN GERMANY.

There are, of course, some perplexing questions which may long remain unsettled. There are some hundreds of German dentists who are practicing under American diplomas, as well as a small body of native American dentists to whom the law also permits practice without passing the state examination. Owing to the widely differing qualifications which obtained in America in former years, and the abominable activities of the bogus colleges, the regular German graduates have been unable to decide how far to recognize even their own countrymen who bear American degrees, leaving the whole matter largely to personal preference. The result has been that many of the German-American dentists have combined to form a flourishing society for themselves and support a society magazine. The native American practitioners have some local societies and generally are members of the American Dental Society of Europe.

THE PROBLEM OF THE PRACTITIONER WITHOUT DIPLOMA.

But a much more troublesome question is the position of men who, from being at first laboratory workmen, have come to practice every branch of dentistry. The technical skill of these men is sometimes considerable, and they, as is the case with a similar class in England, outnumber the regular practitioners. Germany has been so long developing her system of dental education, that these men have naturally sprung up to supply a demand, and they cannot be legally deprived of their means of livelihood. How they shall be educated, assimilated, or eliminated is a problem of a very complex nature. Possibly American experience may contribute something to its solution, but more probably only purely German patience and understanding and rectitude can find a fitting way.

A PERSONAL TRIBUTE.

I have purposely refrained from complicating this sketch with references of a personal nature, not even mentioning some few of the names of the distinguished men who have advanced German dentistry. I have wished only to present to my American brethren a panoramic view of the condition of our profession among a people with whom my active life has been passed, from whom I have received unending kindness, and whom I admire and love next only to those of my own blood.

WHAT THE GOVERNMENT IS DOING TO PREVENT DISEASES.

By **M. C. SMITH, A.M., D.D.S., D.M.D., M.D., Lynn, Mass.**

(Read before the National Dental Association, in general session, at its annual meeting at Washington, D. C., September 10, 1912.)

WHAT is our government doing for the health of the people? Probably few have any idea whatever of the magnitude of the work being done along those lines by the government. This subject is difficult of access, since the work is being carried on under practically every department of the government, but especially under that of Agriculture.

When I first began to think about writing this paper, I wrote to our representative asking whether it would be necessary to come to Washington to look up the matter. His reply was: "No, I shall send you some of the reports," and he sent me over 20,000 pages of printed matter—and in all this not a line from the department of Agriculture.

This will give you a small idea of what is being done by the different departments.

VARYING VIRULENCE OF DISEASES.

All civilized governments consider it wise to know something about diseases peculiar to foreign countries, so that in case diseases should be imported they may have a working knowledge of them and be the better able to combat them. Again, some mild diseases, when transplanted to other soil and in a different environment, become much more virulent; the black man's disease for instance, hookworm, is an altogether different disease in the white man. The black man, having been subject to that disease from long exposure lasting probably for untold generations, has developed a certain amount of immunity to contagion; but when this disease is transplanted into soil where there is no immunity, it assumes a more virulent form. The white man's diseases—tuberculosis, measles, smallpox, and others—when transplanted to Indians, have a like result. It therefore behooves all governments to look well to the milder forms of infection, which may change their nature at any time, and become a menace to the country to which they migrate.

The destruction of the Roman empire has been attributed to the invasion of the barbarian hordes from the north, but, had not the life of the Romans been poisoned by malaria injected into their veins by the mosquito, they would have been able to rally to the defense of their country. Not until the Italian government, armed with a knowledge of the life-cycle of malaria, began to fight the mosquito, did the Italian people advance with the strides we see them taking at the present time. North Africa was at one time a populous country compared to what it is today. Is the reduction of population due to intestinal parasites or to soil bacteria?

DUTIES OF THE PUBLIC HEALTH AND MARINE HOSPITAL SERVICE.

Our government has seen the need of being acquainted with such diseases before they make their appearance here, and consequently it has established outposts at which they can be studied, and is keeping a lookout for those that are already within our bounds. That work is done under the head of Public Health and Marine Hospital, presided over by Surgeon-general Rupert Blue, who is assisted by 444 medical officers stationed throughout the United States and foreign countries. To this department the general public health is intrusted; it co-operates with and assists the health authorities of the individual states; collects statistics on the prevalence and geographic distribution of disease, suppresses epidemics, investigates infections and epidemic diseases, maintains the national quarantine and the examination of immigrants, regulates the manufacture and sale of vaccines, serums, and antitoxins, and furnishes medical service for various branches of the government service and for the sailors of the merchant marine.

HEALTH MEASURES ON THE PART OF THE AMERICAN CONSULATES.

The American consuls throughout the world report weekly the number of cases and deaths that have occurred from contagious diseases in their districts. Whenever cholera, yellow fever, or plague breaks out, it is reported by cable, and ships coming from those ports are closely watched. The American consul has considerable power; no ship can leave a foreign port bound for any port in the United States without having its clearance papers signed by the consul, giving it a clean bill of health, and in case an outbreak occurs after the ship has left port, that fact is immediately cabled to the government.

THE YELLOW FEVER EPIDEMIC IN NEW ORLEANS, 1905.

A good illustration of the method and the usefulness of the work done by the government was furnished in the outbreak of yellow fever in New Orleans in 1905. When the disease got beyond the control of the local government, they appealed to the Federal authorities, who took charge of the situation. They began at once to attack the disease from all quarters. At that time the full life-cycle of yellow fever was known. The patient was screened to prevent the mosquitos from becoming infected; the breeding-ponds of the mosquito were destroyed, or screened when practicable, to prevent the adult mosquitos from laying their eggs. In this way the disease and the carriers of the disease were successfully fought.

THE PLAGUE EPIDEMIC IN CALIFORNIA.

Again, when plague broke out in California, the public did not realize that rodents were the intermediate hosts of the disease. Since the local boards of health were unable to rise to the emergency, the government's men had to take charge; they found a herculean task upon their hands, but at once they realized that the ground squirrel as well as the rat was a carrier of the disease. When we consider that square miles of the waterfront of San Francisco were built on piling, over the water, that many of the streets were paved with planks, that it has a mild climate, and that it is a port for the exportation of grain—where could a more ideal environment exist for the home of the brown rat? And only an eyewitness can form any idea what the squirrels on the plains around Contra Costa meant; they were there by the millions, and only an expert marksman was able to kill them. When the government realized, however, that the ground squirrels were infected, and in some places found their hutches literally filled with dead ones, the farmers suggested to let the disease spread, for it would kill their pest—the squirrel. But the squirrels did not all die; some recovered and became living carriers of the disease. The government therefore selected an area of land five miles wide and far from the infected district, and determined to thin down the squirrels on that area to such an extent that they would not be able to carry the disease to other colonies. It also determined to destroy the rat in San Francisco by attacking it from all quarters, cutting off its food supply, destroying as far as possible its habitation, catching all they could, and poisoning all that would eat poisoned food; and they succeeded in practically exterminating the rat from that infected area. If the government accomplished nothing more than to demonstrate that the rat can be exterminated, it did a work which paid many-fold for all the expense incurred.

Two well-equipped laboratories are being maintained—one at San Francisco and the other at Seattle—where a special study of plague is being pursued to ascertain if other animals than the rat, ground squirrel, and mouse are hosts of this disease. It is very well-established that in America the flea is the carrier of the disease from the rodent to man; in other countries, especially Central Asia, there are other avenues of infection. The wild duck, for instance, seems in some way to be connected with the life-cycle of plague.

REGULATION OF THE MANUFACTURE OF VACCINES.

The Public Health service regulates the manufacture and sale of all vaccines, diphtheria antitoxin, tetanus antitoxin, and similar products sold in interstate traffic or imported from abroad; it examines these products as to purity and standard, inspects the manufacturers' plants, and if they are satisfactory, issues a license for one year, at the end of which time another examination is made.

Ophthalmia neonatorum. This department is also trying to enforce a uniform method of treatment of ophthalmia neonatorum, by the use of a standard solution of one of the silver salts, with which the eyes of the newly born are washed, thus practically doing away with blindness in children.

QUARANTINE REGULATIONS.

Probably you are all familiar with the quarantine regulations. The port physician comes on board of incoming vessels to examine everything, from the bridge to the keel; it is his privilege to say who shall land and who not; his word is law. The government's intention in establishing the quarantine was to prevent disease from being imported into this country.

Besides the port physician, medical men are assigned in practically all the large cities of the world to inspect passengers coming to this country, and in districts where special diseases exist, extra men are stationed. For example, favus and trachoma from Europe, yellow fever from South America, cholera and plague from Asia are specially watched for. On its frontier the Russian government has established detention hospitals where emigrants are kept under observation for a number of days before they are given a clean bill of health. Those bound for the United States are under the care of our own medical officer. The ports of the Mediterranean have been guarded of late for cholera. The Isthmus of Panama has been especially guarded since the outbreak of yellow fever at Guayaquil and other South American ports. All of the Panama ports and plantations are watched for outbreaks of any contagious diseases which might be exported with the fruit. In case of an outbreak of any disease on board a ship bound for a port in this country, the machinery of the quarantine department is immediately set in motion, and if the facilities at that port are not adequate to handle a large number of immigrants, which is rarely the case, the ship is sent to some port where the facilities are adequate. Owing to such watchful care, very little disease has been imported.

The quarantine is the medical watchdog of the country, whose mission it is to keep out disease. Such prevention is often much easier than it is to eradicate disease after it has once gained a foothold in the country. This is well illustrated by our present epidemics of smallpox, which seem to break out when least expected, all over the country, and which, with the lax enforcement of our vaccination laws, it seems impossible to eradicate. Still, our quarantine must be on the alert for any new importation of that disease, especially as that form of it which is already in our country is of a very mild nature and shows a low death-rate, while the form which is prevailing elsewhere is of a much more virulent nature and shows a higher death-rate.

MARINE HOSPITALS.

The government maintains 23 marine hospitals and 118 marine hospital stations, where during the last fiscal year over 52,000 patients received treatment. At nearly all of these stations provision is made by which, in case of an outbreak of disease nearby, men can be dispatched to do research work and to study the disease under its most favorable environment. When the government wanted to study typhus fever, a man was sent to Mexico, where the disease was prevalent, and through this investigation it was clearly proved that the body-louse—*pediculus vestimentorum*—was the carrier of the disease. Whether there is an intermediary host was not quite proved, but probably the cycle was one from man to louse and from louse to man. Later it has been shown that the head-louse can also carry the disease.

AMERICAN OBSERVATION STATIONS ABROAD.

The government supports a tuberculosis sanitarium in New Mexico, where the most scientific treatment of the disease is afforded the patient, under ideal climatic and sanitary conditions.

In the Philippines beri-beri has been receiving special attention, and some progress has been made; for while it has not yet been ascertained just what this disease is, it has been demonstrated that, with a diet of less polished rice and more animal food, the disease has practically disappeared from the native soldiery.

While the station at Panama is primarily intended for watching for contagious diseases that might cross the Canal zone in either direction from South America, the hospitals and laboratories at Ancon and Colon are busy with research work, especially on trypanosomæ or sleeping-sickness diseases. One important fact has been demonstrated that in the passage of *trypanosoma gambiens* through guinea-pigs, the virulence is increased, while in the trypanosoma of Togo the virulence is diminished. That is a very important point, and may mean that a serum for immunizing against sleeping sickness will be available.

Few realize the amount of laboratory work that is being done at Ancon hospital. During the month of June there were 1335 blood examinations made, principally for malarial parasites; also 1354 stools were examined, principally for intestinal parasites, with the object of protecting the country from a fresh invasion of intestinal parasites, brought home by a returning employee of the Canal commission. Rabies has also been exterminated in the Canal zone, and, if we consider the number of dogs kept there, the result was undreamed-of.

CESSPOOL SANITATION.

One of the greatest works that have been undertaken by the government was delegated to Dr. G. W. Stiles, professor of zoölogy. It was his mission to devise and construct a sanitary privy, and one at the same time cheap enough to be available by the poorest and humblest of people living in the rural districts. The ordinary privy, if one exists on the farm—and it is safe to say that on the average in all the states not half of the farms have a privy—is of rather poor construction. Frequently, if any attempt at all has been made to clean out the droppings, they are tipped over at most any angle. The seat is often split, the back part is open—rather an unsanitary picture. Privy accumulations are the ideal breeding-places for flies, typhoid, hookworm, amœbic dysentery, Cochin China diarrhea, and other zoöparasitic diseases, while the ground under and around becomes impregnated with the fluid contents of the privy vault, furnishing an ideal breeding-ground for many parasites injurious to animal and man. As the privy is frequently close to the well, the drainage from the vault to the water supply of the well is soon established. The flies that breed in the accumulation may not be disease-carriers in the sense of being part of the cycle of any particular disease, but they can carry many bacteria on their feet, and as they generally make three daily visits to the kitchen, is it any wonder that disease is rampant during the breeding-time of flies? Dr. Stiles has spent much time on devising a sanitary privy, in the form of a deep, water-tight, dark, and fly-proof tank. The droppings are collected with the urine, and the fermentation that is constantly going on in hot weather soon destroys all micro-organisms, spores, and eggs. Experiments have also been made with disinfectants and cultures of yeast. The privy covers all requirements of safety, and requires a minimum amount of care to be kept clean; still the first cost may be some obstacle to its general adoption.

Nothing is too small for the government to investigate, for full reports are made out as to how to kill fleas scientifically and cheaply, how to kill mosquitos and ticks, or any other parasite that attacks man or beast.

LEPROSY INVESTIGATION STATION AT MOLOKAI.

At the leprosy investigation station at Molokai the cultivation of the bacillus lepra on artificial media has been accomplished. An acid-fast bacillus has been grown on artificial media and a pure culture obtained. This means much to our country—as we are surrounded by so many points of infection and so many sources from which the disease can be imported, besides having several foci of disease within our own bounds, it was quite a question what was best to be done. Now, since it is possible to make a positive diagnosis by the culture of bacillus lepra from the patient, and with the use of chaulmugra oil, the disease is losing much of its horrors, and I trust that the scene that was enacted a few years ago, of shutting a supposed victim of leprosy in an open freight-car and shunting him from one state to another, will never be repeated in this enlightened land.

PELLAGRA INVESTIGATIONS.

At the marine hospital in Savannah, special work is being done on pellagra, a disease that is assuming an alarming aspect, as it is spreading rapidly and shows a very high mortality. In 1909, Passed Assistant Surgeon Lavender was sent to Italy, and in association with men from the London School of Tropical Medicine he made a most exhaustive study of the disease where it seems to have originated. These investigators, however, were not able to decide to the satisfaction of all just what this disease is, the Italians holding to the idea that it was due to the use of diseased corn as an article of food, while the English and Americans are inclined to the belief that it is either due to a parasite of a protozoal nature, conveyed by some blood-sucking insect that acts as an intermediate host, or to a water-borne trematode worm, genus *Filaria*. Whatever the etiology of this disease be, when it can be clearly proved how it originates and how it is carried to the human body, a great advance will be made in the method of treatment, but before this is demonstrated, we cannot expect much success in the treatment.

SPOTTED FEVER INVESTIGATIONS.

A special work has been done in the Bitter Root Valley, Mont., on spotted fever. After the conviction had been gained that the tick was the carrier, dipping tanks were built and all domestic animals that were habitats of the tick were dipped in an arsenical solution to destroy the tick, while wild animals were killed.

INFANT PARALYSIS.

Poliomyelitis, or infant paralysis, seems to baffle all attempts at establishing its identity. Despite the gigantic work done by the several state boards of health, especially that of Massachusetts, assisted by the various district boards and backed up by all the machinery of the Federal government, it is still a mystery how this disease is communicated to man. While its etiology has not been established, much progress has, however, been made in the treatment of this disease. It now seems to be due to a dust-carried source of infection; if, on the other hand, it be insect-carried, the fragrant bed-bug is most probably the offender.

"EPIDEMIC FUND."

The annual law passed by Congress appropriating the "epidemic fund," contains a provision that the appropriation may be used in aid of state and local boards of health in enforcement of their quarantine regulations, as well as for the national service—said appropriation to be used, however, only in the fight against certain specified epidemic diseases, viz, cholera, yellow fever, smallpox, typhus fever, and bubonic plague. On the appearance of any of the above-named diseases, if any state requires it, the officers of the Public Health service are at once on the scene. When aid is extended, the government's funds must be expended by its own officers, and the latter are placed in charge, with the cooperation and assistance of the state and local laws and regulations.

The Public Health service may be found in the states investigating other diseases than those named in the epidemic law, viz, typhoid fever, infantile paralysis, cerebro-spinal meningitis, hookworm disease, pellagra, dengue fever, milk-sickness, etc. These investigations are generally made at the request of the state health authorities.

Much work is being done by other departments, in the line of pure food, pure drugs, economy, etc., all with a view toward the conservation of our natural resources and the health and comfort of mankind.

SCOPE OF THE FEDERAL GOVERNMENT'S WORK.

The cardinal duties of the Federal government in conserving the public health are, first, the prevention of the introduction of contagious and infectious diseases from without, as well as their spread from one state or territory to another; second, the investigation of communicable diseases, the conditions favoring their spread, and the measures necessary for their prevention; third, the dissemination of sanitary information thus acquired; and fourth, co-operation with state and local authorities for the protection of life and health.

Without question, it is the right and duty of the general government to engage in the most thorough scientific investigations, to collect all possible statistics, and to publish broadcast important sanitary and hygienic information. Specialists have been and are being developed on various subjects, such as typhoid fever, pellagra, hookworm disease, infantile paralysis, scientific disinfection, etc.

The research work carried on during the past year included tuberculosis, with special reference to the blood and transmission of the disease by milk; typhoid fever and hookworm disease, the longevity of their causative agents, and the means necessary for their destruction in nature; typhus fever and its transmission by the body-louse; pellagra; infantile paralysis; cancer in the lower animals; the "straw mattress disease"; immunity; the oxydases, with reference to their defensive action in the animal body; the influence of bleaching on the nutritive value of flour; therapeutic properties of the thyroid and suprarenal glands and the commercial preparations of them. Investigations including viruses, serums, and toxins used in the treatment of disease are made, and standard units are prepared for anti-diphtheric and anti-t tanic serums. The identification of the animal parasites of man, also rabies, and the administration of anti-rabic treatment, are also being studied.

I am indebted to the government reports and to the *Medical Times* for much of the information contained in this paper.

CO-OPERATION OF THE DEPARTMENT OF AGRICULTURE.

The department of Agriculture has been doing a great amount of research work along many lines. Anthrax, one of the older European diseases of cattle, has made its appearance many times in America, but it has been stamped out wherever it has made its appearance among cattle. For some time, however, it has been appearing in sporadic cases in man, and in some localities quite frequently. Occasionally a case of anthrax in man simulates an alveolar abscess, and any young practitioner might make the mistake of diagnosing a case of anthrax as an alveolar abscess, and telling the patient to go home and wait another day—which delay would be fatal.

Sheepdogs imported into New York are kept in quarantine, and their feces are examined for tapeworms and other intestinal parasites. They are found to be largely infected with a tapeworm that inhabits the intestines of the dog and completes its life-cycle in the embryo state in the brain of the sheep, producing a disease called "gad."

Matter found in goats has been dried and proved to be a trypanosoma that can be communicated to man through the medium of milk. An outbreak has recently made its appearance in Texas, and a special commission is to be sent there to see what can be done to eradicate the disease.

Actinomycosis has been fairly generally reported from all over the country, and is now classed as a reportable disease. Any person sending pus to the state boards or to the government is assisted in making a diagnosis, which is of inestimable value for the dentist, who is thus made aware of the true condition existing and can take precautions to protect his patient from extension of the disease to the lung, where it assumes a form which is often mistaken for tuberculosis, and which when once established is fully as fatal.

CO-OPERATION OF THE BUREAU OF ENTOMOLOGY.

The bureau of Entomology has not been idle. They have worked out the "browntail" rash, and the disease similar to tuberculosis of the lungs, due to the irritation from the fur of the browntail moth.

Poisonous plants are carefully studied —*i.e.* those which are poisonous to animals, and through animals to man. Some plants are poisonous to animals, such as the loco weed, but man in partaking of the flesh of animals affected with the loco poison suffers no apparent harm.

[See also *Discussion*, as reported under "Proceedings of Societies," this issue.]

MOUTH INFECTIONS:

Their Etiology, and a Consideration of What Effect They May Have on the Vital Organs and Other Tissues.

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(Read before the National Dental Association, in general session, at its annual meeting, at Washington, D. C., September 11, 1912.)

FOLK lore, fiction, and the drama are replete with details of devastation of life, in epidemic form, during preceding centuries. The rapid decrease in population from this source has been far in excess of the decimation of the race from any other causes, including warfare and all natural disturbances. Today, we know that some form of pathogenic bacteria was the direct cause of all these countless plagues and scourges. It is difficult for us even to imagine the panic of fear, in those ages, when any infection appeared in a thickly populated district. Immediate flight from the abodes of men was the only sure protection from death.

During the past seventy-five years, science has brought to our view one by one the specific micro-organisms which are responsible for different diseases of this type. This is best illustrated by the great strides made in the effacement of epidemics throughout the civilized world. Death in a large proportion of those infected in such epidemics was rapid, and the subjugation of such scourges was an achievement which excited the admiration of everyone.

MODERN STUDY OF MICRO-ORGANISMS.

During the past twenty-five years the study of micro-organisms has shown that certain types of bacteria may exist in certain portions of the body in quantities not sufficient to produce immediate death, but capable of producing toxins. These bacteria may attack the structure of the heart, the lungs, the kidney, the liver, the spleen, the brain, the spinal cord, etc. As a result the infected individual may die some years later from nephritis, endocarditis, tuberculosis, etc., but the real cause of death has been the constant development of certain forms of bacteria from which the deadly toxins have proceeded directly to the most vulnerable vital organ.

Excluding pyogenic disturbances emanating from surgical or traumatic causes, invasions of such bacteria appear to be limited to the intestinal tract, the nasopharyngeal region and adjacent territory, and lastly to the mouth, from which source many of the infections of the previously mentioned regions have their origin. There are undoubtedly still many unknown parasites. It has only recently been discovered that many minute organisms are invisible even through our most powerful microscope. The last disease discovered—by Flexner—to be caused by a submicroscopic parasite is epidemic poliomyelitis or infantile paralysis. He says that all the known members of the class of submicroscopic organisms are disease producers. Miller in his great work on micro-organisms of the human mouth, first published in 1890, repeatedly dwells on organisms which he was unable to develop. His great work in this field only served to make him positive that there were many bacteria which remained to be discovered.

SUSCEPTIBILITY AND IMMUNITY TO BACTERIAL INFECTION.

At the present time it is commonly understood that the majority of known pathogenic organisms are constantly with us. It is impossible to find a mouth free from bacteria. Why they are harmless in the body one day, when perhaps on the very following day they may in the same person produce infection, is not thoroughly understood. It has, however, long ago been recognized that immunity is not due to any one cause, and this has made its study a very complex one. That the vulnerability of different people varies we well know. Certain people lose their immunity much more readily than do others. It is generally believed that differences in the character of the micro-organism have a strong bearing on the susceptibility of the individual.

At the present time we are reasonably assured that certain forms of bacteria which attach themselves to our bodies, and to surfaces like the mucous membrane of the mouth, defend these tissues from more injurious parasites striving to gain a foothold. Even where immunity does not exist, as has been demonstrated in certain infections, there must be an abrasion of the skin or mucous membrane before infection is possible. This barrier is overcome when certain insects, like the mosquito and the fly, inject the micro-organism directly into the circulation. Malaria, yellow fever, and other diseases are caused in this manner.

THE SOUND MOUTH AN EXTERNAL BARRIER TO INFECTION.

It is well known that under some conditions a perfectly healthy person may be the carrier of pathogenic germs and thus may become the means of infecting some person who is not immune. Flexner speaks of other factors which contribute to determine infection. He says:

> The period of childhood is especially characterized by a class of infections that depend upon imperfections in the anatomical barriers that are far more adequate in adult life. Many of the diseases that we associate with childhood—measles, scarlet fever, diphtheria, epidemic meningitis, and poliomyelitis—utilize the mucous membranes of the nose and throat to gain a foothold in the body, because they are notably vulnerable. Their crypts or depressions afford a lodging-place in which multiplication of the parasites can be effected. and the breaks in the epithelial covering constitute the first breach in the external defense which the parasites seek to and successfully do enlarge.

This argument will apply with even greater force to the unclean mouth with decaying teeth. The congested condition of the gums with accumulations of débris as well as salivary calculi, exposed as they are to the dust contents of the air and fluctuations of temperature, tend probably to depress their protective powers to even a greater extent than the epithelium of the nose or throat. It is but a step for such bacteria to pass to the tonsils and the pharyngeal region. In fact, the greatest benefit to be derived, especially by the child, from frequent prophylactic treatment of the mouth is the ability to have at all times a reasonable physiologic mouth, and thus keep intact one of the greatest barriers to infection. This is by no means an easy lesson to teach even to the most intelligent of our patients.

For some years I have been attending a family residing in the suburbs. There was constant objection to bringing the children to the city for monthly prophylactic service, not on account of the expense, but because the mother feared possible infection to the children while traveling to and fro. On this account she never permitted them to ride in the cars in the city. It was so impossible for me to convince her of the prophylactic value of a clean mouth as a defensive agent to the infections she feared, that I felt compelled to request her to seek another practitioner.

PHAGOCYTOSIS AND IMMUNIZATION.

So far we have considered what are known as the external barriers to infection. These alone would be entirely inadequate to prevent the spread of many diseases of parasitic origin. There is a second line of defense, the internal, of much greater importance than the first, on the strength of which immunization is chiefly dependent. Flexner describes this as follows:

> It consists of a group of substances contained within the blood, but not produced there, and passing from the blood into the lymph, where they exert influence on the cells composing the organs, and upon parasites in the interstices of the tissue. The chief site of the production of these protective and healing principles—immunity principles, so called—is the very place where the blood corpuscles themselves are formed; namely, in the bone-marrow, spleen, and lymphatic glands. The principles are divided into two classes of substances—one soluble and dissolved in the fluid plasma, and the other corpuscular and suspended in it; the latter consists of the motile white cells, or phagocytes—and together, in virtue of their soluble form and ready motility, they are able quickly to reach most parts of the body where their peculiar properties may be exerted. Not only are these immunity principles in action in all individuals, in whom they operate against intending infections, but they become rapidly increased when infection has been established; and the ultimate issue of the condition in spontaneous recovery or the reverse depends upon the degree of this response and the competence of the curative bodies evoked to reach and to suppress the infectious agents.
>
> The normal body possesses, therefore, great potential power of resisting infection, and this power can be quickly raised, on demand, to a higher level, so as to ward off disease—through a rapid augmentation in the number of circulating white corpuscles, or phagocytes, and by means of an increase in the dissolved principles the purpose of which is to act upon and injure the parasites and to neutralize their toxic or poisonous products. This process is either identical with or closely related to that which takes place during recovery from infection, which consists in the bringing into being of a new set of operations that gradually reinforce the natural resistance—a process termed immunization. The indications of the immune condition are found by the appearing in the blood, sometimes between the fourth or fifth and the tenth day of the disease, and somewhat later than they have already appeared in the spleen and bone-marrow, of highly potent substances that are directed in a specific manner to the direct neutralization of the poisons which have been and are still being produced by the parasites, and to the destruction of the parasites themselves through heightened phagocytosis. As recovery progresses, the soluble immunity principles continue to increase, until, at the termination of the disease, they are present in the blood in quantities that suffice, often, by a passive transfer to another individual, to protect him more certainly from infection or to terminate abruptly an infection already established. If in imagination we substitute for man a large animal, such as a horse, and if we conceive the immunization process to be carried forward by design and in a manner to cause the minimum of damage and to produce the maximum of immunity response, we have presented to our mind's eye the principles as well as the method upon which the serum treatment of disease is based.
>
> I should like to emphasize, at this point, the fact that the foundation of the modern specific treatment of infectious diseases by serums, by inoculation of dead bacteria, and even by specific chemical compounds, rests upon the working-out—in laboratories, upon animals and man—of the manner in which spontaneous recovery from disease takes place. It has been through imitation of nature's way of curing disease that the efforts of modern control have been forwarded.

One result of scientific work of this form has been demonstrated in the benefits obtained from injections of dead bacteria in certain forms of pyorrhea alveolaris where the internal line of defense is abnormally weak. There are, however, many factors which influence the possibility of curing infections which still remain to be solved by scientific investigation. Nevertheless it is most essential that we possess a clear understanding of the present scientific view on the subject of immunity before considering the special field of infections originating in the mouth.

ORAL INFECTIONS.

The forms of bacteria in the mouth which have been of especial interest to the dentist have been the pus-producing or "pyogenic" bacteria. At the same time there are many reasons to suppose that numerous other organisms may be highly cultivated in different portions of the mouth, and under favorable conditions become the direct cause of pathogenic disturbances in any of the important tissues of the body.

In studying the subject of oral infections it may be well to divide them into two classes: First, conditions in which the infection is found in the mouth; and second, where the infection is sealed in what is known as a blind abscess in the alveolar process in the intra-apical region. Frequently infections of the latter class will come under the first class when, by reason of some increased irritation and inflammation or of operative interference, the heretofore confined pus finds an outlet into the mouth. The mouth is at all times the habitat of numerous pyogenic bacteria, which are ever ready to produce infection and pus formation if immunization becomes impaired.

PURULENT AND NON-PURULENT EXUDATES.

What is pus, and how is it distinguished from inflammatory non-purulent exudations? Pus may be said to be a term applied to a collection of leucocytes or white corpuscles, chiefly dead, occurring in an inflamed area of the body. There is always associated with the white corpuscles constituting the pus a certain amount of serum, also derived from the blood. When the serum greatly preponderates we speak of the exudate as serous, in contradistinction to purulent, but all real inflammatory exudates contain pus cells, which are revealed by the microscope. Hence purulent and non-purulent exudations are distinguished by macroscopic differences and by microscopic differences of degree rather than of kind. Thus a purulent and a non-purulent inflammatory exudate can be caused by the same micro-organisms. A given bacterium will produce at one time a purulent and at another a so-called non-purulent or serous exudation. The presence of purulent matter in the mouth may be due to various causes. The most common is perhaps the ordinary alveolar abscess, where an infected dead pulp becomes a focus for a continuous flow of pus through the alveolar plate into the mouth. Following this in frequency are the various pathologic conditions around the peridental tissues, which are most commonly grouped under the term pyorrhea alveolaris. In such cases there is always a lack of immunity against the first line of defense, and as a result infection starts at the most vulnerable point under the gingivæ and progresses toward the ends of the roots of the teeth. This results in the formation of pockets alongside the denuded cementum of the root, which increase in capacity according to the gravity of the case.

Another cause is some form of trauma, which plays an important rôle in the formation of pockets of this nature alongside of individual teeth. The destruction of the first line of defense in such cases is mostly produced by improper dental operations. The great number of cases where only one or two teeth are affected in this way gives us absolute assurance that purulent exudations of this nature are not contagious. Another source of free pus in the mouth is found in impeded eruption of third molars. Purulent exudations in the mouth may also come from impaired tonsils or from the pharyngeal region. Exfoliating pieces of necrotic bone or roots are also frequent etiologic agents.

EFFECTS OF INGESTED PUS.

The effect upon the rest of the body of the constant swallowing of purulent matter has been the subject of much argument. Many physicians have accustomed themselves to the habit of calmly dismissing this subject and assuring their patients that all bacteria and pus are destroyed in the stomach by the gastric secretions. Miller's experiments published over twenty-two years ago have been corroborated in every scientific laboratory which has taken up the study. He showed clearly that mouth bacteria are carried into the stomach and thence into the intestines. Granting that certain forms of bacteria are destroyed in normal quantities of gastric secretions, the fact remains that the stomach is devoid of acid peptic secretions during a large part of the time. Digestive action is stimulated by the taking of food. The mere swallowing of saliva and water does not suffice to cause a true digestion. At the commencement of a meal there is scarcely any acid in the stomach, and only two or three hours later is the maximum amount of acid found. Science has today practically eliminated the idea that the gastric juice is a barrier to the passage of bacteria and pus from the stomach into the intestines. Recognizing the fact that everyone is constantly swallowing bacteria, the question arises as to the outcome. Another phase of immunity must answer this query. Undoubtedly most of the swallowed bacteria are destroyed, not by the digestive secretions of the stomach and intestines, but by competition with the normal intestinal bacterial flora which has, so to speak, pre-empted the ground, where the nutriment is, after all, limited in quantity.

When, however, instead of merely swallowing the ordinary bacteria mixed with the food, the individual is constantly swallowing certain amounts of pus, an entirely different problem presents itself. The nature, virility, and number of the micro-organisms must have a strong influence as to their ability to overcome the surface immunity of the digestive tract. All forms of diseases of the stomach and intestines are possible. By means of their development in the digestive tract such bacteria are very easily absorbed in the circulation and pass into the lymph spaces. After this fortress of the body has succumbed, the bacteria with their poisonous results appear to be irresistibly drawn to the most vulnerable of the vital organs. Medical literature is replete with citations of almost every form of disease due to pyogenic bacteria which are traced to this one source. Hunter gives the following very lucid classification of possible results:

> (1) Local affections, such as stomatitis, periostitis, sinus infections, inflammation and infection of the tonsils and the pharynx. Besides these diseases we meet with many cases of diseases of the middle ear and different portions of the eye, and a host of diseases of the skin often very remote from the mouth. Amongst these may be mentioned acne, alopecia areata, eczema, erythema, herpes, edema, seborrhea, erysipelas, and others.
>
> (2) Glandular affections, especially about the neck.
>
> (3) Gastric and intestinal affections, such as septic gastritis, septic enteritis, colitis and proctitis, appendicitis, cholecystitis, and septic inflammation complicating typhoid ulceration.
>
> (4) Hematogenous infections, causing pleurisies, empyemata, nephritis, pyelitis, and perinephric abscesses, cholecystitis (and among surgical affections, most notably, osteomyelitis) and ulcerative endocarditis, various toxic effects on the blood, nervous system, and kidneys, connected with sepsis.
>
> The poisons act sometimes more on one particular tissue—for example blood (causing septicemia, pyemia, anemia); or the nervous system (producing severe mental and degenerative effects). Sometimes the toxins may act more on the organs of excretion—for example the kidney (producing nephritis); sometimes on the skin (producing rashes); sometimes on joints (producing so-called rheumatic swelling).

All these different diseases have been noted by Hunter as a result of his hospital investigation into their etiology. It is not our intention to point out in detail every disease capable of owing its origin to pus in the mouth. The character of cases cited is sufficient to indicate that every pyogenic bacterial infection can possibly have its origin in this manner. Hunter's interesting statement of the localization of these toxins in some organ in one case, and again in some other organ in another case, is borne out by many celebrated clinicians. If we ask the question why certain bacteria or their toxic products localize in particular organs, the answer must consist in a statement of observed facts, since an answer in principle is not possible with our present knowledge.

CARDIAC DISEASE DUE TO ORAL INFECTION.

Most local infections, and abscesses especially, are caused by the pus-producing bacteria. These bacteria are known to localize by preference in the heart, the kidneys, and the voluntary muscles. The endocardium of the heart and the endocardium of the valves especially are subject to the localization of the pyogenic bacteria. It is believed that the susceptibility of the heart valves is determined in part by mechanical conditions, namely, the force with which the blood is thrown against the heart valves in the course of the cardiac systole. Under these conditions the bacteria suspended in the blood may be forced into the cells covering the surface of the valves. Once localized there, they are more readily capable of multiplication. The pyogenic bacteria suspended in the blood tend also to be deposited in the glomerular capillaries of the kidneys, where they may multiply; but on the whole, the number of cases in which abscesses are produced in the kidneys in human beings as a result of a general pyogenic infection is not very large. The number is much larger in the experimental staphylococcus infection of the rabbit. Bacteria circulating in the blood are deposited by preference in the bone-marrow, spleen, and liver, in which organs they may, and often do, degenerate, but in which sometimes they multiply and produce local lesions.

Several factors enter into the separation, by the different organs, of the bacteria present in the circulating blood. They include (*a*) size of capillaries, (*b*) rapidity of the circulation, and probably (*c*) capacity for elimination.

PUS IN THE MOUTH DUE TO IMPAIRED NUTRITION.

It must not necessarily be taken for granted, where there is a diseased condition of the heart, kidney, or other vital organ, and at the same time a free flow of pus in the mouth, presenting symptoms known as pyorrhea alveolaris, that the mouth condition is necessarily the etiologic factor. In such cases the pyorrhea is more often the result of the malnutrition rather than the cause of the same. Just as the toxins from mouth bacteria attack some special organ, we find that the malnutrition resulting from an inflammatory disease of some important organ impoverishes the circulation and consequently impairs nutrition. This impoverishment varies in character and form—not yet scientifically determined—according to which organ may be affected and the extent of the pathologic tissue. This impairment of nutritive cells is found at its maximum in the ultimate capillaries. The gum and peridental sockets afford by far the best example of the most ultimate of capillaries.

VARIED CLINICAL PICTURE IN PYORRHEA ALVEOLARIS.

It is not unreasonable to suppose that the chemical change that takes place in the blood under such circumstances varies according to the organ involved and the nature of the malady. This accounts for the great difference in the clinical picture of the gums in different forms of pyorrhea alveolaris. Irritation from uncleanliness soon destroys the first defense, and the clinical appearance of the localized infected area varies from the soft, spongy, bleeding gums in diabetes, to the firm, pale, and indurated gum in chronic nephritis. It varies from the dark purplish gum in valvular affections of the heart, to the livid, light, pale gum in pernicious anemia.

These differences in the clinical picture, when once understood, point with unerring certainty to the original cause of the disease. Many years ago I was impressed with the value of mouth inspection in applicants applying for life insurance, especially when some incipient form of malnutrition exists. Referring the matter to one of the largest companies, I was met by a positive refusal even of investigation, because the officers did not desire to increase the difficulty of taking out an insurance policy.

BLIND ABSCESSES, AND THEIR EFFECTS.

Considering now the second division of our subject, we are confronted with an entirely different clinical picture. The fact that teeth may have abscesses at the ends of their roots without the exudation therefrom reaching the mouth has long ago been noted. But it is only since the use of the X ray has become known in bringing to our view the detailed picture of the alveolar process that we have been aware of the large number of blind abscesses which exist. Even today the radiograph is used so sparingly for diagnostic purposes that it is difficult to estimate the number of people who are suffering from the constant absorption of pus sealed in the bony recesses at the end of a root, of which there is no external evidence. Gilmer of Chicago estimates this number at twenty-five per cent. of the population.

Most of these abscesses are a result of the putrefaction and infection of a dead pulp in a tooth. There is, however, a proportion of abscesses which develop around the end of the root without any infection from the pulp, as these are known to be vital in many cases. These are known as pericemental abscesses. There is also a certain proportion of such abscesses found at the ends of teeth in which there have never been any fillings, and which have never even had any external defects of structure; but, on being opened, the pulps are found to be dead. In such a case it is not unlikely that the death of the pulp is due to the pericemental abscess.

Inflammation with subsequent infection in the periapical space is at once accompanied by an effort of nature to limit the area of the pathogenic exudate, and as a result we find a thick fibrous envelope, a granulomatous defense, surrounding the same and thereby protecting the adjacent parts as much as possible.

The variation in the anatomical picture of the blind abscess is very great, both as to size, shape, thickness of protecting envelope, and character of the exudate. When the power of the toxins rises to a certain pitch, the envelope ceases to be able to protect the adjacent tissue. The inflammation becomes more extensive, the exudate forces its way between the sheaths of the tissue and generally terminates in an opening into the mouth by way of the alveolar plates. The spongy character of these plates makes their infiltration with pus a comparatively easy matter. Blind abscesses have been known to remain quiescent for many years, and then, on account of some change which has not as yet been scientifically demonstrated, exhibit such an increased activity as to produce an open alveolar abscess.

Macroscopical investigation has demonstrated the fact that there must be a great variation in the constitution of the exudate, in the number of cells, color, and odor. The scientific investigation of these variations should prove to be an interesting subject. Another field for investigation is the determination of what may be the difference in bacterial nature between the exudate of a pericemental abscess and one resulting from putrefactive pulp tissue. There is very little doubt that in most cases of blind abscess a gradual absorption of the bacteria is going on continuously. The pathogenic bacteria escape from the local foci of infection by penetrating into the surrounding pervious lymph spaces and capillary vessels, into which they push through continuous growth, or are carried by their own motility or by motile phagocytes. If time permitted it would be interesting to detail the histories of some of the numerous cases of blind abscess which have been followed by lymphatic infections, skin affections, septic endocarditis, arthritis, nephritis, etc. That such pathological conditions ensue is borne out by the clinical observation of most reliable authorities.

BACTERIOLOGY OF BLIND ABSCESSES.

Given a large carious cavity with a dead pulp, it is most probable that any of the well-known pyogenic bacteria could find a most favorable lodging-place in such a pulp, where propagation would be a very simple matter. Undoubtedly it is necessary to make a bacteriologic investigation of the exudate in such abscesses, and also of the focus from which they spring, before we can make any scientific assertions as to the diseases which may ensue from such a pus product. This will be no easy task for the investigating dental bacteriologist. Some valuable work has already been done. In discussing this subject at the last meeting of the American Medical Association, Dr. C. J. Grieves of Baltimore stated that, together with Dr. W. S. Baer of Johns Hopkins University, he had made a study of over a hundred-odd cases in which apical infection in blind abscesses was the primary portal of entry resulting in septic arthritis. In some of these cases of blind abscess they were able to isolate absolutely the infecting micro-organisms; this was found in all cases to be the staphylococcus. He says further:

> In almost every instance there had been some bad *apical* dentistry done—some portion of necrotic tissue left or some effort made to fill the root-canal. . . . . These cases were of long standing, with abnormal temperature that ran for months. Some simulated tuberculosis, but most of them were arthritics. . . . In many fistula cases associated with arthritis (not blind abscesses), when the fistula healed, the temperature of the patient would go up, showing pressure absorption from retention of pus, and when the fistula was opened and drained, the temperature would become normal again.

It must be remembered that these two researchers were only investigating arthritic conditions. A few isolated cases will not suffice; they must be so numerous and of so great a variety of disease as to satisfy the scientific world. Clinical evidence, however, leaves us today in a position to believe that such investigation will show that there are very few infectious diseases which may not start in this manner. If anything approximating such a condition is found to be correct, it makes the blind abscess much more dangerous to the individual than free pus in the mouth. In these cases there is absolutely no escape from the penetrating bacteria. The symptomatic rise in temperature that so often accompanies them probably depends in a degree on the amount of bacteria that are able within a given time to escape in the circulation.

SEPTIC DENTAL OPERATIONS.

Unfortunately as a profession we must admit that most of the cases of blind abscess are the results of imperfect dental operations. In some cases these may be the result of bad judgment on the part of the operator, in others they may be due to ignorance and incompetence, but a very large number of cases are attributable to the failure of an educated dentist to give the time needed to perform an aseptic operation and leave the field absolutely free from the possibility of future infection. This is undoubtedly nothing short of malpractice when done by a dentist who knows. In a number of these cases the fee which the dentist could obtain, if he gave the necessary time, would be so small that it would not give him a living wage. In most instances the fear of losing the patient, if they charged a moderate fee for the time needed, causes many dentists to perform what may justly be termed septic dental operations. Very likely few of them realize the grave danger to the life of the patient that may result from such methods. The time has arrived when we should understand that the art of our labor is only a means toward preserving the health of the most important part of the body. Without deriding the great value of the mechanical part of our profession, and realizing that its usefulness is in proportion to the skill and manipulative ability of the dentist, we must recognize the fact that no dental work is permissible if any danger of infection lurks in its midst. The solution of this problem is the education of the physician and also of our patients to a realization of the danger of leaving septic foci in any part of the mouth.

CONCLUSIONS.

Summarizing, we can safely assert that the health of the individual is always menaced by infection, if pus is allowed to be produced in the mouth or locked between the walls of the alveolar structure. All local causes of infection should be removed as far as feasible.

Neither the mummifying method nor the retention of small amounts of pulp tissue in a root-canal should be tolerated. Adequate methods of pulp removal have been evolved which are feasible in the vast majority of cases. This means removing from the root-canals, in an aseptic manner, every particle of organic tissue, and sealing both ends of such an aseptic canal with a non-infectible filling material.

If a tooth is to be preserved under such conditions, the time required to perform properly such an operation should never be curtailed.

If for any reason it becomes impracticable to carry out a pulp operation on these lines, the patient's interest is best served by the extraction of the tooth.

[See also *Discussion*, as reported under "Proceedings of Societies," this issue.]

DENTAL CLINICS IN MANILA.

By **LOUIS OTTOFY, D.D.S., Manila, P. I.**

TWO years ago I had the honor to report the condition of the various dental clinics up to April 1, 1910 (see DENTAL COSMOS, August 1910), and last year I brought the report up to April 30, 1911 (see DENTAL COSMOS, October 1911). The present report brings it up to July 30, 1912, showing that in the various clinics of this city there have been 9319 patients treated, the operations aggregating 23,951. The accompanying tables show the nature of the operations, the institutions in which they were performed, race, sex, etc.

Since the report made last year no services have been rendered at the Girls' Orphanage, Home of the Holy Child, or the School for the Deaf and Blind; the inmates of the last-named institution, however, visit the clinic at St. Paul's Hospital. Neither has there been any work done in the public schools, on account of lack of funds, while at the University Hospital (formerly St. Luke's) there was service for three months since the last report, the service being discontinued for lack of funds.

In Bilibid (federal) prison, the work commenced in 1906 has been continued, but during the present year one of the hospital attendants has been doing considerable dental work, of which no report has been made to me, and it is therefore not included in this report. Hence the accretion of nearly 4000 operations and about 1200 patients was largely made in that institution.

The Philippine General Hospital appears in the list for the first time; a dental clinic is now in the course of establishment in that institution. There is an immense medical clinic there—in fact, one of the largest in the world, and the dental clinic is destined to be a correspondingly large and beneficial one. I have been appointed to take charge of that clinic, as I have been in charge of all those mentioned in this report.

SERVICES RENDERED IN THE DENTAL CLINICS IN MANILA (MAY 1, 1905, TO JULY 30, 1912).

——	St. Paul's Hospital.	Bilibid Prison.	Public Schools.	University Hospital.	Girls' Orphanage.	School for Deaf and Blind.	Home of the Holy Child.	Philippine General Hospital.	Grand Total.
Treatments	7,636	1,520	1,381	1,033	176	21	43	. .	11,810
Extractions	6,132	1,053	16	281	2	9	. .	. .	7,493
Amalgam fillings	350	3	1,321	125	103	13	33	. .	1,948
Cement "	423	20	503	63	35	4	7	. .	1,055
Gutta-percha fillings	400	8	213	73	3	2	. .	. .	699
Gold fillings	31	1	. .	. .	. .	. .	. .	. .	32
Cleaning cases	84	16	37	1	9	. .	1	. .	148
Vulcanite plates	126	6	. .	3	. .	. .	. .	. .	135
Vulcanite plates repaired	5	. .	. .	. .	. .	. .	. .	. .	5
Gold crowns	265	22	. .	3	. .	. .	. .	. .	290
Porcelain crowns	92	1	. .	. .	. .	. .	. .		93
Richmond "	4	. .	. .	. .	. .	. .	. .	. .	4
Bridges	213	12	. .	1	. .	. .	. .	. .	226
Regulating cases	2	. .	. .	. .	. .	. .	. .	. .	2
Prosthetic noses	7	. .	. .	. .	. .	. .	. .	. .	7
" upper lip	1	. .	.	. .	. .	. .	. .	. .	1
" lower lip	1	. .	. .	. .	. .	. .	. .	. .	1
" ear	1	. .	. .	. .	. .	. .	. .	1*	2
Total	15,773	2,662	3,471	1,583	328	49	84	1	23,951

* This case is a prosthetic ear, made before the opening of the clinic.

SHOWING NUMBER OF PATIENTS, WITH SEX, RACE, AND INSTITUTIONS IN WHICH SERVICES WERE RENDERED.

Sex.

Males	6309
Females	3010
Total	9319

Race.

Filipinos	8994
Whites	208
Chinese	54
Mixed	38
Japanese	20
Negroes	3
Indians	2
Total	9319

Institutions served.

St. Paul's Hospital	6626
Bilibid Prison	1311
Public Schools	940
University Hospital	336
Girls' Orphanage	73
School for Deaf and Blind	18
Home of the Holy Child	14
Philippine General Hospital	1
Total	9319

CORRESPONDENCE.

A PROSTHETIC USE OF ALUM.

To the Editor of the Dental Cosmos:

Sir,—About four months ago I encountered in practice something which I think has been experienced by a great many others, and the publication of the case may perhaps be useful. A patient aged forty came to see me whose oral condition was as follows: Upper jaw edentulous—teeth extracted about three years before; gums badly shrunken and quite spongy. The patient had had *nine* sets of teeth made by as many dentists; none of the sets, however, would stay up over a week. I made a set—with the same result.

I got the patient to come in again, when I had him rinse his mouth with a strong solution of alum—one-half ounce of lump alum dissolved in three ounces of warm water, the patient rinsing the mouth and retaining the solution about one minute. This caused the gums to shrink, and while this condition obtained I took a plaster impression and bite. I then made a set of teeth that has given him entire satisfaction for the past six months. The idea was to cause as much shrinkage as possible in the spongy gums, so that with returning normal expansion the plate should fit tightly. This plan will be found worth trying.

Yours truly,
R. B. Moore, D.D.S.

Solon, Ia., September 21, 1912.

PROCEEDINGS OF SOCIETIES.

NATIONAL DENTAL ASSOCIATION.

Sixteenth Annual Meeting, held at Washington, D. C., September 10 to 13, 1912.

GENERAL SESSIONS.

Tuesday—*First Session.*

The first general session of the sixteenth annual meeting of the National Dental Association was called to order at 10 o'clock Tuesday morning, September 10, 1912, in the ballroom of the New Willard Hotel, Washington, D. C., by the president, Dr. A. R. Melendy, Knoxville, Tenn.

The President introduced the Rev. Dr. J. Henning Nelms, Washington, who invoked divine blessing on the deliberations of the association.

The President next introduced Dr. William Tindall, member of the board of Commissioners of Washington, who welcomed the association to the city on behalf of the board of Commissioners, as follows:

WELCOME FROM THE BOARD OF COMMISSIONERS.

Mr. President, and members of the National Dental Association,—As the representative of the government of the District of Columbia, it gives me pleasure to bid you welcome to the hospitality of the seat of government of the United States, but regret to have to say for the municipal authorities that circumstances over which they have no control prevent them from greeting you in person.

As some of those present may not be familiar with the character of the local government at the national capital, I have to state that it is an autocracy, and that the Congress of the United States is the autocrat.

Near the termination of the Continental Congress which was in session at Philadelphia, the unpaid soldiers of the revolutionary army made a threatening demonstration to that congress, with the object of hastening payment for their services. Bearing this in mind, the convention which prepared the constitution included in that instrument a provision that the future seat of government should be subject to the exclusive legislation and authority of Congress, such as it exercises over forts, magazines, arsenals, etc. Hence, those who come here to reside and abjure their residence in the states, thus voluntarily surrender all right to participate in the governmental functions of citizens, and retain only the privilege of petition. They may propose, but Congress disposes.

Congress indirectly governs us by a vice-regency, consisting of a board of three Commissioners, two of whom must be our own citizens. These Commissioners are appointed by the President of the United States, and have the power to make police and health regulations and other enactments bearing a general analogy to ordinary municipal ordinances, but none affecting transfers of property or the law of descent, and the like. Our real and personal property is taxed for a fair share of the municipal expenses, but Congress has absolute power to determine how it shall be spent, and exercises that authority. Yet, when all the elements of our municipal problem are considered, there is little real ground for complaint of our treatment by Congress, and much ground for congratulation on its wise consideration of our needs.

Andrew Fletcher, the intractable Scotch genius of Saltoun, stated that he knew a very wise man who believed that if a man were permitted to make all the ballads, he should not care who made the laws. Horace Fletcher, our masticating mentor, advises us that we need not care for the physician if we keep our teeth in good working order, and make diligent use of them. While fools after forty need a physician (if we have any right to live at all after that age), who can do without the dentist? Shakespeare emphasizes the paramount province of dentistry in "Much Ado About Nothing," wherein he affirms—

> For there was never yet philosopher
> That could endure the toothache patiently—

plainly implying that even though a philosopher might risk his professional reputation by having need for a physician, he may still consistently avail himself of the services of the dentist. Of all the consequences of the sins of the fathers which are visited upon the children to the third and fourth generations, such as deafness, hip-joint disease, catarrh, paresis, tuberculosis, and a myriad other forms of carious and vicarious pathological expiation, none is so general as that which affects the teeth. The relation of this latter affliction to our happiness is well illustrated by the response of the boy to a passer-by, who, noticing the depression on the boy's countenance, sympathetically advised him to "Cheer up!—it might be worse," and received the doleful rejoinder, "I guess you never had the toothache."

The art of the sculptor has not produced a more impressive effect than the pathos exhibited in the group entitled the "Laocoon," which protrays a father and his two sons in the toils of two serpents. The account which Virgil gives as the artistic motive for the group ascribes its origin to a commonplace occurrence in connection with the siege of Troy; but a more discerning interpreter of the composition ascribes to it the sublime didactic purpose of depicting a father incurring with his sons the pathogenic consequence of his moral transgression, while he is also subjected to the mental agony of noting the distress he has entailed upon his innocent offspring. In the light of that concept the group should be enlarged by another figure symbolic of Æsculapius hastening to the relief of the victims, and displaying as a conspicuous feature of his equipment the distinctive implements of dental beneficence. It is the happy opportunity of the dentist not only to alleviate local misery, but to facilitate the harmonious working of the whole bodily economy by keeping in order the machinery essential to that end.

The service rendered to humanity by dental art is incentive to indefinite commendation, but my province today is restricted to the pleasure of extending to you the courtesy of this municipality. It would be superfluous to tell you that the authorities and people of the District of Columbia feel honored and pleased by your selection of the national capital for the deliberations of this session of your association, but the Commissioners are glad to assure you that they welcome you in keeping with that feeling. With your eyes on the endless vista of progress and your feet in the straight and toilsome path of duty, there is no limit to the blessings you may continue to confer, nor to the benediction you will deserve and receive.

Dr. F. O. Hetrick, Ottawa, Kans., responded to the address of welcome on behalf of the association, as follows:

Response to the Address of Welcome.

Mr. President, ladies and gentlemen, and my dear "Mr. Washington,"—Dr. Tindall, will you kindly permit us the familiarity of calling you "Mr. Washington"? You are his representative. Since the day of early beginnings, it has seemed imperative that there be a Mr. Washington, an entity, which represents something tangible; for we have looked upon Washington, the city, as a secondary consideration, and Mr. Washington as the soul of the nation. Some who have been here since last week have been so unsophisticated as to glance into every back yard which they passed, looking for the small boy with his hatchet, and had they found one, I am sure he would have been borne off as a trophy, as well as positive proof that they had actually seen him.

On behalf of the National Dental Association, I want to say how much we appreciate this cordial welcome, these words of kindly greeting, and this assurance that everything within the power of the citizens of this beautiful city will be done for our comfort and happiness. We are going to feel at home, and we are glad that you are willing that we should.

The unique situation of this city stimulates in us a personal interest in its citizenship. All sections of this great country add their quota from the very life of their own citizenship, in the *personnel* of official dignitaries; even the backwoods can furnish a Lincoln for the presidential chair. Therefore the city of Washington holds a personal interest for every citizen of this great nation, as he feels a bit of it belongs to him.

Today we feel as happy as children come home to grandpa's for Christmas dinner. There is not one of us but has one or more personal friends in Washington, friends of other days, friends of our early manhood and womanhood, when closer ties are forged than come to men and women in later years; and so again we are doubly glad to be in Washington and receive this cordial welcome.

We come from every part of our great country: From the West, with its timber, its mines, irrigated lands, and its lengthening shadows; from the middle West, where the cattle of a thousand hills and ten thousand valleys combine with the hen, the wheat, and other products to make our people rich, so that they no longer are subservient to Wall st.; from the sunny South, with its courteous gentlemen and gentlewomen, its timber, its cotton fields, its minerals, and its memories; from the North, with its tremendous industries of mining, timber, and agriculture, and from the East, with its great cities, its manufactories, its shipping, its dignity, and its traditions. Thus we come from all sections, representing many ideas, yet as a representative body of one profession, we bring with us but one ideal, the motto of which is—"Progressive achievement."

Our ideas are as varied as the sections we represent. I understand that here in this city you worship Mr. Precedent almost as much as we worship Mr. Washington; yet with us, Mr. Precedent does not amount to a second thought, because it is Fact we seek.

Now, seeing you are so glad that we did come, we are going to let you into a secret or two. Before we do that, I want to say that we have some very wise and very profound gentlemen here, almost as profound as the old darky preacher—in telling this story I want to say that it is an old one, for Dr. E. C. Kirk told it at a banquet last night and I have had it typewritten for some time; but it illustrates the point I wish to make. The old darky preacher arose and after announcing his text ("Dem dat has shall git mo', but dem dat has nuffing shall have whut dey got done took away") raised his right hand and said: "Bredereren, dis text contains de hidden mysteries of de infinitesimal, and it is hard to subjunctuate, but I's here to explain the unexplainable, to lucinate your hallucinations, and to unscrew the inscrutable." We have men here who can do all this—aye, e'en more. Why, we have a few men here who have openly admitted that they are going to revise our constitution. Some of them have been at it now for ten years, and they have gotten as far as—"Whereas, believing the constitution of the National Dental Association needs revising—we are the lads to do it!" We have brought them down here to Washington in this constitutionally legislative atmosphere—of our Washington, if you please—to see if Mr. Washington cannot help them get it through, at least before the inauguration of the next republican president.

But why haste? Great men are not generally creatures of a passing moment, nor is a great measure the thought of an hour, but the result of long and vigorous training, sometimes merely the evolution of public sentiment. Things worth while do not happen quickly. This young nation, less than five hundred years ago, was but a band of sturdy pioneers, who braved the terrors of an unknown sea that they might plant the principles of liberty in this soil of ours. Gaining a foothold in the new country, they began at once sending other pioneers into the trackless forests. These men in turn with their families were surrounded by new dangers of cold, hunger, wild beasts, and hostile Indians. They were thrown back for a time, but not for long; that kind of people will not be denied. Thus was the conquest of our land attained. The spirit of those sturdy pioneers has lived again in the hearts of the pioneer in dentistry. We too are confronted by trackless forests and unbounded prairies to subjugate. The spirit of conquest is likewise afire in us, and we shall not be satisfied until we can say of many unsolved problems, *Now we know!*

When the thirteen colonies consolidated that they might stand together as a unit against the common enemy, they selected Washington as their seat of government. They came by primitive methods of transportation. Today we come thundering over the same country, in limited trains at from thirty to sixty miles an hour, over the same land they traveled with their ox-teams at from fourteen to twenty miles a day. We come by auto and all other methods of rapid transit, even by the balloon—that is, if Dr. L. E. Custer has arrived. The problems we have to solve here are many; we even have personal enmities to eliminate. We dentists are younger than the nation, but we meet each year with the same undaunted courage and purpose that, as a profession, we shall be able to announce a forward step over the year preceding. We are seeking a happiness that comes with attainment, such a happiness as Edison feels in his sixteen hours of hard labor daily performed in his laboratory, or Jane Addams at Hull House, amid the strenuous cares of her civic conquests.

Our pioneer investigators were happy only when working out the secrets that held the destiny of the dental profession in their grasp, and were satisfied only when, like Wordsworth's "Happy Warrior," they could say:

> Who, not content that former work stands fast,
> Looks forward, persevering to the last;
> From well to better, daily self-surpast.

So again let me say we are glad of the opportunity to meet in this city of traditions, high courtesy, and splendid achievement. It is most fitting that in such a place we re-pledge and renew our faith in "Progressive achievement." [Applause.]

The next order of business was the Address of the President. Dr. L. L. Barber, Toledo, Ohio, vice-president from the East, occupied the chair while the president, Dr. A. R. Melendy, read his annual address as follows:

President's Address.

Fellow members of the National Dental Association, ladies and gentlemen:

It is with difficulty that I find language by which I may fitly express to you my deep appreciation of the many honors which you have conferred upon me from year to year. For five consecutive years I was unanimously chosen for the honored office of treasurer of your association, the duties of which position, though laborious, I found to be not unpleasant by reason of the uniform courtesy and consideration shown me by all of the members; and in the discharge of those duties it has been my pleasure to form many lasting friendships and to make many enjoyable acquaintances among the members, all of which I will ever prize most highly.

THE PRESIDENTIAL HONOR.

When, at the last annual session of this body, you again unanimously conferred upon me the highest honor within your power to give, my cup of joy seemed full to overflowing, and I would be remiss in the finer feelings of true manhood did I not take this opportunity of expressing to each and every one of you the pleasure and gratitude which I so truly and deeply felt at receiving the new honor which you then bestowed upon me. I desire also to express my appreciation of the very efficient and loyal services of our recording secretary, whose duties this year have been particularly arduous, to the Executive Council, Executive Committee, the Local Committee, and to all of the officers and committeemen, the faithful and united efforts of all of whom have made possible the presentation of our splendid program for this meeting, so rich in scientific data, progressive thought, and advanced operative methods.

THE NATIONAL CAPITAL AS HOST.

At the invitation of the District of Columbia Dental Society we have assembled in our national capital for our annual session. As a people we have long believed that ours is the greatest nation on earth, and the world is rapidly coming to accept our faith in our country and belief in its greatness as fact. We are proud of our capital city. We are proud of its magnificent system of parks, broad boulevards, beautiful homes, public buildings, art galleries, impressive monuments, and above all, its splendid citizenship. That it is now or in the not far distant future will be the most beautiful capital city of all the nations of the world, we firmly believe; and it is indeed a great privilege which we enjoy, to meet under such favorable and auspicious environment. And I feel confident that this session will be an epoch-making one in the history of our association.

IN MEMORIAM.

As friend meets friend today in the exchange of happy greetings, the thoughts of many hearts are turned to the absent ones. Some are detained by illness, some by duty, and others have passed to the great unknown.

> To the past go more dead faces,
> Every year,
> As the loved leave vacant places,
> Every year:
> Everywhere the sad eyes meet us,
> In the evening's dusk they greet us,
> And to come to them entreat us,
> Every year.
>
> But the truer life draws nigher,
> Every year;
> And its morning star climbs higher,
> Every year:
> Earth's hold on us grows slighter,
> And the heavy burden lighter,
> And the Dawn immortal brighter,
> Every year.

Shall we stand for one minute and in silent meditation honor the memory of our comrades who during the year have passed from this life into the mystery of the immortal.

THE YEAR'S PROGRESS.

During the year past nothing of a particularly unusual character has taken place in the dental world. We have been going steadily forward, assimilating and putting into actual practice the many great truths which have been advanced, and have been keeping fully abreast with the progress of the world in scientific achievement. Of course, there are insistent problems, lots of them, and there are professional abuses too. The twentieth century has introduced innovations faster than we have been able to absorb them. Invention has crowded upon invention; labor-saving and time-saving devices have poured upon us as in a steady flood. Not only in methods of treatment and practice is this change noticeable, but the very furniture in our offices is undergoing a process of evolution. The people are becoming better educated; there is a higher intelligence in the masses, and their demand is for more efficient service. In the midst of all this, we might reasonably expect confusion and disorder; but not so. In the main the profession is to be congratulated upon the steadfast manner in which it is solving these problems and is adapting standards of education, conduct, and practice to harmonize with and meet the demands of the progressive age in which we live. Thus we stand today in the midst of great things, a great age, an age of immense vitality, growth, change, and development, and it is just as certain as anything can be that we are going to maintain the standard of progress in our profession in a degree equal to that exhibited in any of the learned professions. There is going to be a greater desire for truth, a keener scientific attitude toward new ideas, and our vision is going to be incalculably widened with each succeeding year.

NATIONAL DENTAL RELIEF FUND.

Most of the work of the year will be presented to you through the reports of your committeemen and sections. I desire, however, to call your special attention to the appointment of a committee to solicit and have charge of the National Relief Fund. In compliance with the resolution passed at last session I appointed on this committee Dr. L. G. Noel of Nashville, Tenn., Dr. E. S. Gaylord of New Haven, Conn., and Dr. W. T. Chambers of Denver, Colo. The plan which they have adopted, of asking each state to add one dollar to its annual dues, to be transmitted by the treasurer to the National Relief Fund, is a simple, dignified, and equitable one, and it affords an opportunity for all to help their fellowmen. Tennessee and Colorado unhesitatingly adopted this plan, and several other states have taken favorable action. Some states seem fearful that the addition of even one dollar to the dues will cause a loss of membership, but when the object is fully explained and understood, I am sure all will most gladly and systematically contribute. The surplus of the California relief fund was by resolution placed in charge of this committee as a nucleus, and disbursements must conform to the restrictions of that gift. That fund was accepted by the National Dental Association in 1907, and the resolution controlling it was as follows:

RESOLVED, That the balance of the money now in our hands be turned over to the National Dental Association, to be used as a nucleus for a National Relief fund, the same to be invested in securities which can be quickly realized upon in case of necessity, the interest of which may be employed for the use of superannuated dentists and the principal for the relief of dentists who may suffer from any calamity such as flood, earthquake, or fire.

This fund has been held in the savings department of a national bank at four per cent. interest as most nearly complying with the above resolution, and I commend this very worthy cause to your earnest consideration, and ask that each of you feel that it is his high privilege and duty to co-operate with this committee, in your several states.

REVISION OF CONSTITUTION OF N. D. A.

Another resolution passed at the last meeting is that upon the revision of the constitution, and I ask your permission to read that, because it is of the utmost importance that you act intelligently on a question of such grave significance as a revision of the constitution. The resolution is as follows:

RESOLVED, That in accordance with the expressed wish of the state delegates to the meeting which considered the alteration of the constitution, the National Dental Association will organize along the lines of the American Medical Association.

RESOLVED, That the draft of the constitution drawn in conformity with the above, be printed and forwarded to the state societies with the request that such as desire shall make application for constituent membership at the next meeting, stating how many members they can guarantee.

RESOLVED, That if properly supported by the state societies, the Constitution and By-laws will be finally revised and adopted at the next meeting, the same to take effect at the meeting of 1913.

I am credibly informed that twenty-five of the states have taken favorable action upon this resolution, and the Revision Committee may consider that they have sufficient support to warrant them in reporting the new constitution for your adoption. To my mind, the question of financing the new plan for the first year or two is going to be a serious one, for the reduction of the annual dues from five to two dollars necessarily calls for a very large increase in membership. As treasurer I have had an opportunity to become somewhat familiar with our expenditures, and in conjunction with the Executive Council have endeavored to conduct the preparations for this meeting on as economical a basis as possible, and yet we shall probably require every cent in the treasury to meet the necessary expenses incident to the same. We have been compelled to refuse requests for money for research work along a line that would, I am sure, prove of great benefit to the profession. Hence I say to the Revision Committee: Be sure you look carefully to the question of finance in formulating your report. Do not misunderstand me; I am heartily in favor of this movement after the example of the American Medical Association, but I am perhaps over-anxious that these important details be not overlooked. We need not merely a change, but a change to something better than we have, otherwise we cannot claim to be going forward. The National Dental Association was organized with a membership of three hundred and fifty-seven, and the last report shows a membership of about eight hundred and fifty, having more than doubled since the American and Southern Societies were merged into the National, and its influence and helpfulness to the profession are more and more apparent each year. The ambition for a larger, more powerful, more representative, and more efficient National body is a laudable one, and one in which we are all agreed, our only differences being as to the best and most equitable methods to attain this end. I am very hopeful that when the Revision Committee present their report, it will be so carefully worked out in detail that we may adopt it, and by so doing take another great step forward.

THE FORSYTH DENTAL INFIRMARY.

We read of benefactions galore for carrying forward experimental, educational, or humanitarian work in the healing art, but in our own special field the only benefactions of any considerable amount of which I am aware are those of the late Dr. Thos. W. Evans of Paris, France, for dental educational and research work, and the Forsyth Dental Infirmary for children, the corner-stone of the building for which was laid on June 4, 1912, with appropriate ceremonies, in the city of Boston. This building is being erected and munificently endowed for the perpetuation of its work by two brothers, as a memorial to their deceased brother, and what a truly noble memorial it will be! "Dedicated to the children," to bring about a stronger and healthier generation.

BENEFACTIONS FOR THE ADVANCEMENT OF DENTAL SCIENCE TO BE URGED.

This brings me to the question, Why should there not be other large benefactions for the advancement of scientific dental education for the relief of the suffering poor, for the promulgation of the science of hygiene of the mouth? Surely the care and treatment of the mouth and its contained organs is not a matter of minor importance in the economy of the human system, neither can it be truthfully said that as specialists we are not worthy of encouragement in our efforts, nor that our work is not eminently necessary to the care, development, and protection of the human race. I believe that the fact that so few benefactions are made for our special branch of the healing art is due to the general lack of information on the subject. Those who have money which they would gladly give to a worthy cause have no means of learning about the need of gifts in the great field of dentistry. And how are they to know? How shall they hear without a preacher, and how shall a preacher go unless he be sent? We, the National Dental Association, are the largest representative dental organization in this country, and from this body should emanate the knowledge which shall move the philanthropic rich to remember us in their benefactions. Hence I suggest—yes, urge—that you shall appoint a committee of three whose duty it shall be to present to the proper parties the just claims of our profession to a proportionate part of the benefactions of the world; and this will include the careful exposition of the importance, the needs, and possibilities for good to the human race of such benefactions. In brief, it will be a bureau of information upon this subject.

GOVERNMENT SUBSIDY FOR DENTAL RESEARCH URGED.

From several different sources, my attention has been called to the fact that as a profession we are not reaping the benefits from governmental investigations along scientific and educational lines that we should, principally because we are not in touch with what is being done by our government. The passage of the bill in Congress changing the scope of the Public Health and Marine Hospital Service is of such broad character that now we may hope for some assistance in research work, or we may be able to gain from it a plan which will work to our advantage in studying the ravages of the diseases of the mouth. The assistance which Dr. Kebler of the bureau of Chemistry has given us in making his report on dental mouth preparations is but one instance of the benefits which we might receive from this source. We now have a dental corps in both the army and navy, and I feel that it is incumbent upon the National Dental Association to take some steps toward preserving and utilizing the knowledge which is being passed over and lost to the profession and to the world. To my mind the establishing under the authority of this association of a professorship or chair in research work, and the securing of one competent man who shall devote all of his time to this work at a fixed salary, would be the most practical plan to begin with; and later, when we shall have done some effectual work, when we can show that the findings of such a scheme have tended to the relief of conditions which are detrimental to public health, then Congress may be induced to make the necessary provision for carrying forward the work. But we have no fund from which this salary may be paid at present, hence as a temporary expedient I recommend that a committee of two, one of whom shall be a resident of Washington or of its immediate vicinity, be appointed to take up this important matter and accomplish what is possible under existing conditions, and make definite report to our next annual session with recommendations.

STATUS OF THE ARMY AND NAVY DENTAL CORPS.

By an act of Congress, approved March 3, 1911, and another approved August 22, 1912, the nondescript and odious "contract" position of our dental representatives in the army and navy has been removed, and a grade of regular military rank common to all staff corps is accorded. The naval bill reads that—"Appointees shall take rank and precedence in the same manner in all respects as in the case of appointees in the medical corps of the navy"; that "All officers of the dental corps authorized by this act shall receive the same pay and allowances as officers of corresponding rank and length of service in the medical corps of the navy, and shall be eligible to retirement in the same manner and under the same conditions as officers of the medical corps of the navy."

For ten years or more we have been striving for this small measure of justice, not for any personal or professional aggrandizement, but in order that our *confrères* in the service of the army and navy may have by legal right that social standing and rank to which their culture and training entitle them, and that the learned profession of dentistry may not be brought into disrepute by the intrusion of the "dental hobo." We certainly have reason to congratulate ourselves that so much has been accomplished, and that the agitation of this matter in Congress has awakened an interest, and has won to our cause the friendship of many prominent and influential men—all of which augurs well for future legislation that shall give us in full measure the standing we merit.

All honor is due to the present Legislative Committee and to all of the legislative committees who have labored so assiduously during the past years for this cause, and I take this opportunity of acknowledging my indebtedness to and expressing my appreciation of the untiring efforts in behalf of national dental legislation made by Dr. Wms. Donnally, to whom more than any other one man we are indebted for the passage of these acts by Congress; for, whether as a member of the Legislative Committee or in co-operating with it, his interest and unselfish devotion has never waned, and no sacrifice of time, money, or personal discomfort has been too great for him.

LEGISLATIVE COMMITTEE.

I feel that it is very important that the Legislative Committee for the year 1912–13 be appointed at once, in order that they may keep in touch with the operation of this act, and render such assistance from time to time as may be helpful to those in authority.

The work is too burdensome and expensive for the ordinarily constituted committee, therefore I recommend that this committee be authorized to accept and use contributions at its own discretion.

MEMBERSHIP IN THE N. D. A. URGED.

The rapid development of our profession during the past decade has been so fully treated by essayists in recent years that I find little to add that is new. I do feel that the great meetings we have held—unwieldy though such an assemblage necessarily is—have been conducive to great good for the profession at large. But it is a matter of surprise and regret to me that so many good men, eligible to membership, attend these sessions and partake of all the benefits, and yet do not feel constrained to assume their share of the responsibility by joining the National Association and helping us to the extent of their annual dues at least. This would be to the individual a mere pittance, but in the aggregate a sum that would enable this body to carry forward scientific work by trained specialists, which would add yearly to our definite knowledge and efficiency, and place us in the front rank among the world's great scientific bodies.

PLEA FOR UNSELFISHNESS AND FRATERNAL CO-OPERATION.

I rejoice to see a feeling of fraternal kindness and co-operation becoming more and more apparent, thereby displacing the selfishness and jealousy which have been so conspicuous in our profession in the more distant past. In many localities dentists are experiencing the joy of co-operating with other men engaged in the same general work—the idea of mutual interests and mutual helpfulness is growing. In this great country, with its varied climate and diversified interests, we must expect great differences of opinion. But the underlying principle of truth, honesty, and fair dealing between man and man are the same in frozen Alaska as they are on the sun-kissed shores of Florida, and the heart of a true man is as true in one section as it is in another. Shall we not then catch the true vision, a broader vision of the possibilities of this great national dental organization, and, putting aside all selfish desires and aspirations, resolve that henceforth we shall lend ourselves and our energies to the highest and best. I fear we do not fully realize how even a little friction retards progress. We recognize this truth in mechanics, and, at the slightest hint of friction, hasten to apply oil that the machinery may run smoothly and accomplish its function without wear or waste; yet in greater matters of professional uplift and progress, in which we are vitally and equally interested, we are often unwilling to yield to the judgment of the majority. Or, if our particular friends are not among the chosen leaders, we withhold our co-operation and support. In doing this we are giving way to the selfishness in our natures; we are becoming narrow-minded personally, and to a degree hinder the very cause we would advance, and which it is to our personal interest to advance. I want to see every dentist in this fair land of ours turn his back upon all such selfish action, and experience the joy of living upon a higher plane, of putting aside all petty, personal differences, and of uniting in a determination to make the profession of dentistry second to none in honor and scientific attainment.

Dr. Barber. I want to take this opportunity to congratulate the members of the National Association upon their privilege of hearing so concise and clear-cut an address from our president.

If there be no objection, I shall appoint the following committee to report on the President's address: Dr. James Truman, Dr. F. L. Platt, and Dr. H. W. Morgan.

Dr. Melendy resumed the chair.

Dr. Burton Lee Thorpe. Mr. President, ladies and gentlemen,—I have a very pleasant duty to perform in introducing to you the distinguished dentist of Madrid, Spain, Dr. Luis Subirana, who is professor of orthodontia in the Central University of Madrid, and who is the author of a treatise on Orthodontia, and also a history of Horace Wells, the discoverer of anesthesia. I move you, sir, that he be accorded the privileges of the floor. [Applause.]

Dr. Subirana addressed the Association in Spanish, and his address was interpreted by Dr. A. G. Weber of Havana, Cuba.

Dr. Subirana spoke as follows:

Sr. Presidente, Señoras, Señores,—Siento mucho que el desconocimiento del idioma inglés no me permita expresar en la forma cumplida que deseo la presentación hecha por el Dr. Lee Thorpe, y, muy en particular, la especial predilección que personal y profesionalmente siento por el pueblo americano.

Personalmente, porque desde muy joven y durante largos años de trabajo al lado de un dentista americano de gran relieve en Madrid, el Dr. Highlands, bajo cuya influencia no solo adquirí gran hábito de trabajo y de disciplina, sino que

de él aprendí y con su ejemplo me infundió estricta conciencia en el trabajo repudiando lo mediano y puesta la vista siempre en lo mejor: Y profesionalmente, como dentista, quién no siente una gran admiración hacia el pueblo que fundó la primera escuela, imprimió la primera revista y constituyó la primera sociedad? Pero además de su preponderancia en el pasado, en el presente, de esta América no vienen los más importantes libros dentales, los más sensacionales inventos mecánicos y los más perfeccionados instrumentos que usamos en nuestra práctica; pero además de todo ésto, quién no dirige de nosotros los dentistas europeos la mirada con gratitud y admiración á este pueblo que fué cuna de nuestro infortunado Horacio Wells? A este gran dentista americano he dedicado grandes esfuerzos mios, no solamente escribiendo la historia de su descubrimiento, sino que hice pintar un cuadro de su vida ya muy conocido, y recabé de la Sociedad Odontológica Española que por suscripción le enviara una corona, que está en el cementerio de Hartford, y hemos tenido la satisfacción, los dentistas españoles, de ver cómo después de nuestro homenaje los dentistas de París le levantaban un monumento.

Como profesor de ortodoncia de la Universidad de Madrid he venido exclusivamente á este país para recojer lo último de esta especialidad y llevarla á Madrid como semilla para que fructifique, pero al saber que se celebraba este Congreso, he querido venir á saludar á los amigos que aquí tengo.

Señor Presidente [taking the president's hand]: Un modesto miembro de la dentistería de la tradicional España, aunque sin representación especial de la Sociedad Dental de Madrid, en nombre de ella os estrecha la mano para que trasladeis su afecto al joven pueblo americano dental, ejemplo de laboriosidad y progreso.

[Translation.]

Mr. President, ladies and gentlemen,—I regret that my lack of acquaintance with the English language prevents me from expressing myself in a manner befitting the introduction by Dr. Burton Lee Thorpe, and the special predilection which I have for the American people personally and professionally; personally, because in my youth I acquired the habit of work and discipline from Dr. Highlands, an American dentist of high repute in Madrid, with whom I spent many years, and whose influence and example inspired me in the highest degree with the duty of striving always rather for the greatest accomplishments than for things of less importance. Professionally, as a dentist who cannot but feel admiration for the people who founded the first dental school, printed the first dental journal, and organized the first dental society. Besides their prestige in the profession of dentistry in the past, it is to Americans that we owe at present the leading books in dental science, the most startling mechanical inventions, as well as the most perfect instruments that we use in our practice. Considering all this, is there one among all the European dentists who does not look with gratitude and admiration upon this nation, the native land of the unfortunate Horace Wells? To the memory of this great American dentist I have devoted a great deal of my energies, writing the history of his discovery, delineating a picture of his life, already known to many, and obtaining a subscription from the Spanish Dental Society for a wreath, which has been deposited in Hartford cemetery. We, the Spanish dentists, after our simple homage, have had the satisfaction of seeing the Parisian dentists raise a monument in his memory.

As professor of orthodontia in the University of Madrid, I came to this country solely for the purpose of gathering the best and latest in this branch of dentistry, that I might take it with me to Madrid as a seed which is destined to bear fruit. As soon as I learned that you were going to hold this meeting here, I decided to come and greet my friends.

Mr. President [taking the president's hand], a humble member of the dental profession of historic Spain, though not officially delegated from the Dental Society of Madrid, shakes hands with you

as the representative of that society, and begs to extend the affectionate greetings of the Spanish *confrères* to the American profession—our example of industry and progress.

The next order of business was the report of the Executive Council by the chairman, Dr. BURKHART, as follows:

The Council reports the daily program according to the printed slips that have been distributed.

I am requested by Dr. V. E. Turner to announce that a business meeting of the Southern Branch of the National Association will be held in the small parlor at 5 o'clock on Wednesday afternoon.

I have been requested by the Council to make the following recommendation: That members of state societies who have joined the National Association as such societies, and whose dues have been paid, be received as members for this session of this association.

Mr. President, I move the adoption of the report.

Motion was made and carried to adopt the report.

The PRESIDENT. The next item on the program will be a paper by Dr. N. S. JENKINS, Dresden, Germany, entitled "Modern Dentistry in Germany," read by Dr. A. J. Cottrell, Knoxville, Tenn.

[This paper is printed in full at page 1225 of the present issue of the COSMOS.]

The next order of business as announced by the President was the reading of a paper by Dr. M. C. SMITH, Lynn, Mass., entitled "What the Government is Doing to Prevent Diseases."

[This paper is printed in full at page 1230 of the present issue of the COSMOS.]

Discussion.

Dr. W. W. STOCKBERGER, department of Agriculture, Washington, D. C. I am not sure that at this juncture it would be advisable for me to attempt to say much on Dr. Smith's able paper. One of the primary objects, which I believe is well recognized as being essentially a deterrent in the progress of disease is proper nourishment, and, as we have about reached the time of day when we in Washington are accustomed to take nourishment, I should be standing in the way of your best health if I prevented you from proceeding to that important function.

I am merely one of the many government officers who give some attention to the problems which you have just heard discussed. I am connected with that bureau which is concerned particularly with plants, and in the course of our studies we pursue some lines of work which enable us to point out to stock-raisers poisonous plants which may cause losses of livestock, and we work out methods of antidotal treatment. We are also concerned with the investigation of plants used medicinally, and are testing a large number of drug and related plants from foreign sources with a view to their introduction for cultivation in the United States. Time, however, will not permit me to go very far into details concerning that work.

Reference has been made to the "loco" work which we have been following for several years as a part of the study of the relation of poisonous plants to the serious livestock losses of the western ranges. The study of that disease has progressed to the point where we know that an alkaloid exists in the loco plant, but we are not sure that this alkaloid is the exact cause of the disease, since from the studies which have been made upon it, it has not been found to be particularly toxic. The investigation of a number of other plants believed or known to be poisonous to stock is in progress, and some of these are of importance in the study of human disease.

Although many of these poisonous plants deserve more than a few passing words, I shall dismiss that subject, and turn to another of perhaps closer interest to you. The United States annually imports several million dollars' worth of drug plants and crude drugs, and it is one of the aims of the department of Agriculture to develop the production in this country of such of these plants and plant products as may prove adapted to our climatic and economic conditions. Furthermore, attention is given to the domestication of certain of our wild native drug plants, many of which, like the golden seal for instance, are threatened with extinction.

Another point not covered by Dr. Smith, which I think would be of interest to you from a professional standpoint, is the work which we are doing on plants which yield aromatic or volatile oils. We have introduced in the southern part of the United States the cultivation of camphor. That, as you know, has a medicinal use and a very widespread application industrially in the making of celluloid and similar plastic materials. The production of camphor now bids fair to become a commercial industry, and this at a specially opportune time, I think, since the changing economic conditions in the foreign countries from which this product is obtained apparently point to a diminishing supply for the future. In the southern part of this country many plants occur which yield volatile oils, and at our testing station in Florida we are trying to bring under cultivation some of these plants which seem to offer future promise. Among the native plants which it is hoped may be profitably cultivated is the horsemint (*Monarda punctata*). This plant yields a volatile oil which in turn, gives a relatively high yield of that valuable constituent, thymol. This constituent is gaining importance, especially as it has recently been introduced with favorable results in the treatment of the disease known as hookworm. It is an old saying that wherever a disease exists there is a plant in that locality which is a remedy for the disease. That seems particularly true in this case, because in the South, where this disease exists, there also exists the plant which contains a remedial agent.

I will not weary you with further details of our work, but wish to say that this is an important part of the work which our government is doing to improve the health and the conditions of existence of the people of this country. Through the introduction and cultivation of medicinal plants, and through the study and development of our native plants which contain valuable medicinal constituents, we hope to contribute to the progress of medicinal science, by adding to our knowledge of the sources of medicinal plant products or by rendering the supply of them more readily available.

You have doubtless already inferred from my remarks that we are not so much concerned with the treatment of disease as with the production of some of the remedial agents employed therein. Next in importance to the treatment of disease itself is the development of an available commercial supply of the drugs necessary for the treatment of disease. It is in this way, we trust, that this particular branch of the service is contributing to the development of medication in general as well as to the work of preventive medicine, to which so much attention is given at the present time.

I am especially gratified to note that this great association, which represents a *clientèle* so closely connected with the health and physical comfort of mankind, is deeply interested in reaching beyond the narrow lines of professional interest into the broader and more general lines of medication as affecting the welfare of the whole people.

The President then declared the general session adjourned until Wednesday at 12 o'clock.

WEDNESDAY—*Second Session.*

The general session was called to order at 12 o'clock Wednesday morning, September 11, 1912, by the president, Dr. Melendy.

Dr. H. J. BURKHART. I have the honor of presenting to you the representative of the Surgeon-general of the United States Army, Dr. E. P. Tignor.

Dr. TIGNOR addressed the association as follows:

Mr. President and gentlemen,—It gives me very great pleasure to be here as a representative of the Army Dental Corps, because it affords me the opportunity not alone to see many of the best men of the profession, but also to say a word about the dental corps and its influence. As you probably know, the army dental corps was recognized about eighteen months ago, giving to us commissioned rank. Since that time we have attempted to increase the corps according to the provisions of Congress—which gives us a corps of ninety, instead of thirty, as we had in the past, but unfortunately we have been able to secure only ten or twelve men. This is not due to any lack of applications, because a great many practitioners have applied, nor to undue difficulty of the examinations, which have only been sufficiently thorough to secure men who would be a credit to the profession; but I think it is due rather to the fact that a great many of the best men do not know that such openings exist and what this career means for the young man. While I am here, it would afford me very great pleasure to talk to any of you personally and give you as much information on the subject as possible, and I ask your aid in filling up the corps with men who will be a credit to our profession.

The next order of business was the report of the Executive Council, by Dr. H. J. Burkhart, chairman, as follows:

The printed program, which you all probably have, is the program that will be followed today.

There will be a meeting of the Executive Council this afternoon, at which the following resolution, offered by Dr. Emory A. Bryant, will be considered:

Resolved, That it shall be considered unprofessional for a member of this association to obtain a patent upon any art of treating human disease or ailment or disability, or upon any device adapted to be used in the treatment of human disease or disability, or attached to the human body and used as a substitute for any lost part thereof, or upon any art of making such device, unless such device is adapted to be put on the market and sold.

Tomorrow morning at 9 o'clock there will be a meeting of the Council. I am requested to announce that there will be a meeting of the Journal Committee in room No. 743 at 2 o'clock this afternoon. Immediately following the adoption of this report, Dr. Platt will address the association in regard to the Panama Pacific Dental Congress to be held in San Francisco in 1915.

I move you, Mr. President, that the report be adopted. [Motion carried.]

Dr. Melendy. I now have the pleasure of presenting to you Dr. F. L. Platt of San Francisco, who will address you in regard to the Panama Pacific Dental Congress.

Dr. Platt spoke at length in regard to the proposed Panama Pacific Dental Congress, and invited the National Association to hold its annual meeting in San Francisco in 1915 in conjunction with the Dental Congress to be held at that time—the week beginning with the last Monday in August 1915.

Dr. H. J. Burkhart asked unanimous consent for the acceptance of this invitation, and that it be arranged to have only a business session that year. He made a motion to that effect, which was seconded by Dr. Truman W. Brophy, and was unanimously carried.

The next order of business for the general session was the reading of a paper by Dr. M. L. Rhein, New York, N. Y., entitled "Mouth Infections."

[This paper is printed in full at page 1237 of the present issue of the Cosmos.]

Discussion.

Dr. M. I. Schamberg, New York, N. Y. I deem it an honor to be called upon to open the discussion of a paper which I consider the best and most important one that has been presented to this association in years. I say this without looking lightly upon the papers that have preceded it. Dr. Rhein we all know to be a painstaking, conscientious worker and an enthusiastic teacher. He has done work in the past which has reflected credit upon him and upon his profession, but his present contribution in the form of this complete and explicit dissertation on the systemic diseases originating from infective foci in the mouth, together with the physiologic and pathologic *modus operandi* related thereto, eclipses anything, in fact everything that he has done before to teach an important human economic truth.

As an evidence of my concurrence with him in his views upon the subject I will quote several paragraphs from an article upon "The Reciprocal Influences of Morbid Conditions of the Mouth, Jaws, and General Economy," which I read before the Section on Stomatology of the American Medical Association, at its sixty-third annual session, June 1912.

After a brief reference to the work that had been done throughout the civilized world in promoting the necessary interest in the care of the mouth as a prophylactic measure against disease, this article reads as follows:

> There is, however, much to be done to establish in medical, dental, and lay minds a knowledge of the tremendous bearing that certain mouth and jaw diseases have on the general health, and, furthermore, the manner in which many disorders can be early detected by a careful examination of the mouth. I will not dwell on the fact that many persons are rendered more susceptible to disease by the lowered vital resistance created by tooth, mouth, and jaw troubles. This is too evident to all who give the matter any thought, but I want to lay stress on the frequency with which patients under treatment for mouth troubles are permanently cured of deviations from the normal which originally appeared to have no relation to the local lesion within the oral cavity. It is equally true that many systemic disorders are either directly or indirectly responsible for morbid conditions of the mouth and jaws.

Further on the article reads:

> How very unusual is it, however, for physicians to make careful observations as to the conditions of the mouth as a whole, to determine the presence of lesions on the mucous surface of the cheek, the floor of the mouth beneath the tongue, the palate, the gingival margins of the gum, or the roof and floor of the vestibule of the mouth. These parts to the stomatologist impart even greater information at times than do the tongue or lips. Just as does the dark line in lead poisoning exhibit itself, so do other changes in peripheral circulation leave their mark. Faulty metabolism, auto-intoxication, rheumatism, gout, anemia, diabetes, renal, cardiac, and pulmonary diseases, all show their ill effects on the gingival border of the mucous membrane, and often before symptoms are sufficiently pronounced in other parts to cause the patient to consult a physician.
>
> It is no unusual occurrence in my practice—and no doubt my experience conforms to that of many who specialize in the treatment of diseases of the mouth—for me to refer to the family physician patients who on examination of the mouth are found to be in the incipient stage of one of the many maladies aforementioned. Indeed, I have occasionally found a patient to be in the throes of a well-advanced illness of no trivial character. In several instances, the true cause of what appeared to be an ulcerative or gangrenous stomatitis was recognized as the dreaded oral manifestation of leukemia only after I had insisted on a blood examination.

Then again:

> The reciprocal influence of abnormal conditions of the mouth and jaws on the general economy has not been accorded up to date the importance that it must receive, if the health and welfare of human kind is to be consistently conserved.
>
> Stress should be placed on the eradication of infective foci from the mouth, even though radical surgical procedures and the sacrifice of teeth become necessary. Current literature, both medical and dental, contains many references to the relation of remote diseases to infections arising within the mouth. Infective endocarditis, rheumatism, anemias, and other affections of serious moment are occasionally laid to the door of mouth infection. Many patients in my practice within recent years have exhibited decided attacks of neuritis involving the arm, shoulder, and other parts, that have cleared completely following the surgical removal of an infected area from the mouth. Patients who are suffering from diabetes, kidney troubles, etc., which may have been the predisposing cause of gingival disturbances within the mouth, are usually improved when efficient treatment removes the pus, which by absorption aggravates the systemic trouble.

Before closing I desire to make reference to a paper by Baker* in which he presents a compilation of diseases attrib-

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* Edward H. Baker, "The Natural Field of Dentistry." DENTAL COSMOS, June 1912, page 694.

utable to mouth conditions. According to his list, 125 different affections were traced by scientific men to dental and mouth disorders. In studying the bibliography of Dr. Baker's article, I find that almost all authors quoted are graduates of medicine. I refer to this point as the strongest evidence toward the verification of their findings, and that such reports were not made as the result of biased observations. Though Dr. Baker collected seventy-nine articles, written within the past ten or eleven years, from which he culled the references to the large variety of diseases, such sporadic outbursts of individual enthusiasm are scarcely adequate appeals for the betterment of the cause for which we are working. The dental profession, the medical profession, and the lay public have begun to realize what scientific stomatology will contribute toward health preservation.

Dr. Edward C. Kirk, Philadelphia, Pa. Mr. President and members of the association,—I want to add my word of approval to all that has been said by the gentleman who preceded me in commendation of the paper to which we have just listened. I do not want to be fulsome in my praise of it, but I want to be just, and believe that I am just when I tell you that I regard it as one of the most important emanations that has come officially from the dental profession upon this important topic. I am particularly gratified that the committee in charge of this meeting felt the importance of having such a pronouncement made. As a practitioner of dentistry, as a teacher, and as one interested in the welfare and progress of dentistry, I confess that I have been chagrined and annoyed, as I am sure that everyone of you must have been, when the charge of neglect and ignorance of the conditions with which we are dealing was laid at our doors, not only through professional channels but through the secular magazines and the daily press, by Dr. Hunter of Charing Cross Hospital, London, in a paper on oral sepsis, read at McGill University in October 1911—for the unpleasant phase of that criticism was that much of it was true. I am speaking now within the confidential limits of the professional family, therefore I do not hesitate to say that the fact that much of it was true furnished the reason for the sensations of discomfort that I am sure it produced in all of our minds. Fortunately there was much to be said upon the other side of the question that unfortunately was not said. We have needed some official declaration of the fact that we do recognize these things, and are not all so ignorant and careless as the perusal of Dr. Hunter's paper might lead the uninitiated to conclude that we are. Therefore I am personally grateful to Dr. Rhein and to this association, and I congratulate myself and you that this authoritative presentment of the other side of the case has been made.

Now, it would be utterly useless for me to attempt to discuss the various items of the paper. It is a voluminous one, and the time at our disposal is not adequate for its proper discussion. As a fact, the nature of any discussion that I could present to you would be to agree in general with the various things the essayist has said—because he has given a remarkably clear and careful presentation of what might be called the existing status of our knowledge of the conditions and the principles underlying disease reaction. I use the word reaction in a thoughtful, considerate sense, for I have come to regard the phenomena in the entire field of pathology as manifestations of a reaction upon the part of the organism toward either external or internal irritative sources. One thought that may serve to throw a little side light on the principles involved in the subject under discussion is that expressed by Sir William Osler in his work on the Practice of Medicine, somewhat after this fashion—I cannot quote it accurately, but this is the substance: He said, "It may sound paradoxical, but is none the less true, that few patients die from the disease from which they have been suffering for most of their lives." There has generally been, precedent to the terminal acute and fatal attack, a long period of ill health, so slight perhaps as to pass unnoticed, but which has had as its characteristic effect a gradual depression of that set of conditions which the essayist has referred to collectively as the defensive agencies of the body; these have been running down in efficiency until a point is reached at the level of susceptibility, the point where some wandering microbe, which under conditions of normal health would not be of a sufficiently virulent type to attack that organism, finds only this condition of lowered resistance—the organism has become vulnerable to invasion by the group of bacteria in question, and the patient is carried off by a terminal infection made possible only by his preceding chronic ill health. Now, it is to the conditions precedent to these terminal infections that we should direct our attention as dentists, for there are several oral conditions that are related to the precedent disease which leads to the depression of vitality to the point where terminal invasion may occur and work out its fatal results.

The essayist has spoken of the constant swallowing of quantities of bacteria as a depressing influence. In order to focus our attention upon that condition in a manner that will allow a proper understanding, let me use a simile: We are familiar with the fact that the cinchona tree, for example, produces certain medicinal substances; the poppy plant likewise produces medicinal substances; we speak of a variety of cinchona alkaloids and of alkaloids of opium. We realize that these substances are products of the life activities of the protoplasm of the cells of the plants in question, that they represent the chemical end-products of the biologic activity of the cells of certain vegetable organisms. We know also that in certain diseases where these alkaloidal substances are used as medicines they are useful in bringing about the reaction of the organism that tends toward health, but we also know that if we administer an excessive dose it will kill the patient; we know that this vegetable end-product of metabolic activity is intensely active, and we know also that the unicellular vegetable organisms, so-called pathogenic micro-organisms, in like manner produce end-products of their nutritional activity that are intensely active as poisons; hence in any case where these microbic end-products are taken into the system it becomes a question of the reaction of the human organism to these virulent poisons. It is not ordinarily the organism itself, but its waste product that does the harm. We know what happens from repeated doses of cocain or any of the so-called drugs that enslave; we know that there follows a gradual destruction of the vital resistance to the stresses of life, and how those who become so addicted finally succumb. So that the principle underlying the reactions of the organism to the drug habit applies also, in a degree, to what we may call the toxin habit resulting from the ingestion of the poisonous bacterial waste products.

The study of disease becomes, then, a study of the reaction of the organism to these influences. Whether the organism is attacked locally or *en masse* is determined by the factor of general or localized susceptibility. As the individual who has a lowered resistance is picked out of a crowd with an attack of an acute disorder, and he dies, so also, owing to a localized susceptibility, a circumscribed part of the organism may become the seat of a local expression of disease action.

When I was engaged in the active practice of dentistry a man came under my charge, sent by a physician to have his mouth placed in proper hygienic order previous to undergoing a course of mercury for syphilis. Every tooth the man had was sound, relatively speaking, with the exception of the upper right first molar, and that was pulpless. I had been told by the patient that the tooth in question had been filled twelve years before by a competent practitioner; I therefore assumed, though I did not fill it myself, that is was filled after the ideal standards that have been promulgated by the essayist on many occasions—that is to say, that it was a sterile operation; that, however, was before the days of the X ray. The thing that interested me particularly was the fact that immediately following his syphilitic inoculation —and the affection was then in the early period of the secondary stage—a dento-alveolar abscess developed at the apex of the palatal root of that dead molar, which abscess broke upon the palatal gum surface, and the exudate that passed from that abscess flowed down toward the gingival margin. An erosion of the gum tissue ensued which looked as though the gum tissue had been seared or excoriated by a red-hot instrument about three millimeters in width. Now, it was interesting that the general syphilitic lesion should have ferreted out, as it were, the point of least resistance furnished by that pulpless molar and made its attack selectively at that point. I became so interested in the nature of the root-filling that one day I undid the whole operation to ascertain its perfectness, and so far as I could tell it was perfect. There had been no trouble from that tooth until this systemic infection occurred, and then that point of diminished resistance manifested its weakness. So it was again a question of the contention of two forces, internal and external; the weaker point, as the essayist has described to you, demonstrated its weakness by disease.

There is one point that I missed in the paper, and which I presume in reading it more carefully I shall discover, and that is, the essayist does not appear to have laid sufficient emphasis upon the various conditions which make for susceptibility and immunity. I refer to his statement regarding those highly complex substances that enter into the composition of the blood-stream that are developed under certain conditions, natural or artificial, and which raise the standard of resistance of the individual to infection, and upon which the practice of vaccine therapy is based. But there is, besides that group of complex defensive bodies, opsonins, agglutinins, etc., a factor which I think should be recognized —that is, the chemical composition of the blood, a factor which I think cannot fail to influence the question of susceptibility or immunity. We all know—all who have come in contact with bacteria in a scientific way—how sensitive they are to the simple question of the acidity or alkalinity of the medium upon which we attempt to cultivate them; we know that certain bacteria will thrive on a pabulum that has a certain reaction, and that a change in reaction may retard or inhibit their growth. Now, Talbot, Rhein, and others have called attention very definitely to conditions of pyorrhea that arise in connection with the malnutritional fault resulting in what is called acidosis or acidemia, which results in a lowered alkalinity of the blood. I think all of us as practitioners must have been struck with the frequency of the observations that we have made of mouths where no carious defect has been manifest, and yet that denture has been lost by a fatal attack of pyorrheal infection. The conditions in which these two classes of disorders, caries and pyorrhea, occur are totally different, and fundamentally the difference is a question of food supply to the bacterium, and this in turn is a question which is determined in the individual case by the nature of the blood composition.

With such data before us, one cannot escape the conclusion that the mouth and its contained organs and tissues are in the closest relationship both nervously and nutritionally with the entire organism, and that it is therefore undoubtedly true, as set forth by the essayist, that the closest relationship also exists between infected mouth conditions and various forms of bodily disease; but I wish to emphasize very strongly my conviction that the converse of this proposition is equally true, namely, that the mouth tissues and their various manifestations in health and disease, by reason of the close physiological relationship which exists between them and the general bodily functions, become in their several physiological and pathological manifestations a most important index of the state of bodily health. The observed fact to which I have alluded, of the non-existence of active caries and of active pyorrhea simultaneously in the same mouth is more than simple coincidence. I have already suggested the hypothesis that the chemical composition of the bodily juices upon which the infecting organisms of each of these respective disorders grow is a selective factor in determining the infection in each case. · If that view be correct, then it must logically follow that a principal factor of the cause of susceptibility in either or both cases must be sought for in the chemical composition of the tissue juices and saliva which constitute the food supply of the infecting organisms involved in each case; and, as the composition of the blood plasma and the various bodily juices derived therefrom is dependent upon the food habit of the individual and the nutritional activities concerned with the utilization of the food supply, we can at once appreciate the magnitude and importance of a correct understanding of the story of nutrition both in its local and general expressions, and further, that the mouth, its contained organs and tissues, and the physiological and pathological phenomena which they present, offer fundamental problems for our consideration and, as far as may be, our intelligent solution.

M. H. CRYER, Philadelphia, Pa. The subject of Dr. Rhein's paper I consider of vital importance, not only to the dentist and physician, but to everyone. It is second in importance only to that of anatomy and physiology. Some time ago I wrote a chapter on Hygiene of the Mouth for the "Practical Treatment," edited by Drs. Musser and Kelly, from which I should like to make a quotation:

> The mouth is the workshop wherein are carried on the functions of mastication and insalivation and the preparation of the food for its reception by the other digestive apparatus; and if we add a consideration of its intimate anatomic, physiologic, and therefore pathologic relations through its nervous connections with other portions of the alimentary canal, with the organs of respiration, sight, and smell, and only less intimately with those of hearing, the mouth at once acquires an interest, and its care assumes an importance second to those of no other part of the body.

It is certain that the frequency of the mouth's agency in the production of diseases is often overlooked, though fortunately its importance in diagnosing obscure cases of intestinal infection is becoming more recognized, since Wm. Hunter of London gave us his valuable observations on "Oral Sepsis." It has, however, often been noted that an examination of all the fluids and tissues of a patient may be exhaustive in extent, while a septic mouth is entirely overlooked by the diagnostician.

As Dr. Rhein has told us, when the mouth is studied from a bacteriologic standpoint the necessity of hygienic treatment becomes most apparent, and remedial aims only be accomplished when the teeth can be kept in a healthy condition. Whenever irregularities or disease conditions exist which provide lurking-spaces for bacteria, oral sepsis is bound to be present. The infant's mouth and that of edentulous old age are usually clean, barring constitutional diseases, and, while I do not recommend this condition as a type, it is important that the dentist should realize that he must finish all work so carefully that there are no pockets for germs to occupy, and if a tooth cannot be brought into a clean, healthy, and comfortable condition, it should by all means be removed.

Concerning the cleaning of root-canals, I would say that, in a large number of cases, it is not possible to say whether all "organic matter" has been removed or whether the canal has been completely filled, unless a skiagraph examination be made.

I should like to add one point more in regard to the care that should be exercised in cases of protracted illness, especially that of typhoid fever. Too often a nurse will neglect the thorough cleansing of the mouth; consequently, by the time convalescence begins, and the patient is permitted to resume mastication, the teeth have accumulated unwholesome and often purulent deposits of foreign matter which, becoming loosened and mixed with the food, is taken into the alimentary canal; here it may infect the previously weakened intestinal tract, causing serious relapse and often death.

Dr. TRUMAN W. BROPHY, Chicago, Ill. As Dr. Rhein began to read his paper I observed that quite a number of the members who were evidently not particularly interested left the hall, but before he finished I became impressed with the fact that the number of men and women whom this hall would hold would be a small audience for this remarkable production, and it is fortunate that a scientific paper such as this may be conveyed to all who are interested throughout the world. Some of the most remarkable orations ever delivered in this capital city and in Congress were delivered only to a quorum of the members, and, even though this hall was not filled, I am satisfied that this classic production will be of interest to people of all the languages of the earth.

What does this paper mean to us? Without entering into a discussion of its scientific phases, I wish to state that it means that the usefulness of the work of the dental profession will be taken notice of by scientific bodies everywhere, and that it will be more highly regarded than before. It means that the medical profession, which in the years past has regarded lightly the sphere of usefulness of the practice of our profession, will now look upon it as of far more importance than ever before. The conclusions reached by the essayist in pointing out the maladies which have origin in the mouth will be a matter of great interest to all, especially to medical men, and they will look into regions which have in the past been overlooked, for the origin of the diseases which they have to treat.

It was my great pleasure only about two weeks ago, in the city of Stockholm, Sweden, to listen to an address delivered by that distinguished gentleman, Dr. Horace Fletcher, to the Commission of Hygiene of the International Dental Federation. Dr. Fletcher—I speak of him as doctor, because, if we ever had a doctor according to the true meaning of the word, viz, teacher, Horace Fletcher is that doctor, for he has taught the medical profession how to recognize and treat diseases and cure their patients without the extensive use of drugs. He has taught the dental profession better than it was ever taught before the true sphere of its work, he has taught the dentist a higher regard for his work than he ever had before. So with his paper, Dr. Rhein has brought to us and the world generally a fuller understanding of the sphere of our work.

Dr. T. B. HARTZELL, Minneapolis, Minn. I have no desire to review Dr. Rhein's paper, but I do want to make two or three statements regarding it. Dentistry is standing on the threshold of one of its greatest epochs; it will soon be recognized as one of the important foundation-stones upon which the whole healing art rests. Physicians all over the world are looking more and more to intelligent dentists for assistance in diagnosis and for help in intractable cases. It now rests with us whether or not we will dignify our profession and put ourselves in that position which medicine and the world at large have a right to expect of us. This remarkable paper of Dr. Rhein's, with the author's perfect comprehension of the conditions which face us and with those profound statements regarding the importance of our work, is a contribution which will redound to dentistry and affect posterity as no other production I have listened to in a dental audience in my whole life. I believe that it is but a brief time when any general surgeon who is to operate on the abdomen, or interfere in any way with the system in abdominal surgery, will as soon think of operating when the hemoglobin is less than thirty per cent. as think of operating on a patient who has a septic mouth.

Dr. A. M. NODINE, New York, N. Y. I was very glad to hear Dr. Rhein so lucidly and comprehensively review such great facts, and the thought came to me that Dr. Hunter, to whom the essayist has referred and with whose work we are all more or less familiar, should be justly honored by us. Anyone who reads the articles which Dr. Hunter has read before the British Medical Association will gain a more accurate comprehension of what oral sepsis means. When we consider that Dr. Hunter conducted innumerable examinations, in one series I think two thousand, of microscopical and macroscopical character, in order to ascertain his findings, we shall appreciate what we owe to Dr. Hunter. More recently several other investigators, notable among them being Dr. Curtis of Johns Hopkins University, have given us contemporary information in regard to oral sepsis.

Dr. RHEIN (closing the discussion). It has been very embarrassing to sit and listen to the eulogistic remarks from men like Professors Kirk, Cryer, Brophy, and others, when I feel that in a sense they are not entirely deserved. Whatever value my work will have is due entirely to my effort to do a certain specific duty at the request of this section; the work was not voluntary on my part. Although, with the chairman of your section, Dr. Logan, I felt that the need of the hour was an article on this subject which should be educational to the physician, I did not feel capable of carrying out the work as effectively as it should have been. I realized that it must present the matter without exaggeration and with such clearness that it would withstand any scientific criticism. It was consequently with great trepidation that I undertook the work. While I realize its shortcoming, I trust it will be of service in educating the patient's physician as to the danger of pus foci in the mouth. If it in any way accomplishes the result, I will feel amply rewarded for the time and energy expended.

The lack of dental education in the medical curriculum is the cause of the unpardonable ignorance of so many physicians as to both physiologic and pathologic conditions of the mouth. No one submits his mouth to this form of septic dentistry more than the average doctor. If he only would stop and think, he would realize that septic foci in this region must produce the same effects in the circulation and the lymph spaces that they would produce in any other part of the body. Can we imagine a physician on the score of economy placing his mouth in such a state as to invite destruction of the muscles of the heart? The majority of physicians are treating themselves in this way daily. How can we expect them to give their patients' welfare any better consideration?

The removal of the pulp from a molar and leaving this tooth finally in such an aseptic condition that infection is impossible requires much more difficult technique than the removal of a septic appendix. Yet there is little difference in the danger to life between a septic appendix and a blind abscess. Death comes rapidly as a result of a septic appendix, but none the less surely does it follow a blind abscess because it may take a few years for the incurable organic disease to manifest itself. The unfortunate thing has been that the physician has hitherto failed to realize that this incurable organic disease is the result of a slow toxemia produced as a result of pus in the mouth.

It is my hope that the National Dental Association will be able to use my paper to teach this important truth to the medical world. Every effort has been made to keep it free from exaggeration, which is the bane of most dental propaganda. This tendency to further the interest of a good cause by exaggeration is inherent in all of us, but out of place in a scientific body. The great value of oral hygiene is beyond question. Yet at this time many of the medical profession are distrustful of its real value, because of the exaggerated and framed-up statements that are sent broadcast through the country. We dentists have not yet learned the lesson of resting the merits of our case on a dispassionate statement of proved facts, free from fraud or exaggeration but stamped with the one mark of attempting to seek the truth in whichever direction it may lie.

In reference to the difference in the chemical changes that take place in the blood serum that makes for immunization, I disposed of it in one sentence, because it is too large a subject to be able to consider in its essential features in a paper of this general character. The time does not permit me to illustrate many of my themes with some lantern slides I have brought with me, but I shall be pleased to show these slides at the clinic on Friday.

Dr. Hartzell made a statement which I think should be emphasized. The majority of conditions known as pyorrhea that come to the office of the dentist for treatment are not such as require heightened phagocytosis or a raising of the opsonic index. Such cases are mostly found in the hospitals. They do exist, however.

I have been waiting for many months now for a suitable case for vaccine injection.

Dr. Cryer brought up an interesting point in speaking of typhoid fever cases. Very many typhoid epidemics are due to what are known scientifically as typhoid-carriers. A person recovering from an attack of typhoid is seldom subject to a secondary attack himself, but may convey the germs of the disease to another person. Such an individual is known as a typhoid-carrier. If such an individual has a dirty mouth and carious teeth, here may easily be found a good soil for cultivation and spreading the disease. It may therefore be well to emphasize the necessity of the dentist who has recovered from a typhoid attack being certain that he is not a typhoid-carrier before he resumes his practice.

In closing, let me call your attention to the main point. The great amount of septic dentistry done is because of the inability of the dentist to get a living wage if he takes the time requisite for aseptic dentistry. By educating the physician as to the relation of septic dentistry to life itself, the time must come when the conscientious dentist who is willing to give the time and skill to aseptic dentistry would at least receive a proper compensation for it.

The general session then adjourned until Thursday at 12 o'clock.

(To be continued.)

PENNSYLVANIA STATE DENTAL SOCIETY.

Forty-fourth Annual Meeting, Pittsburgh, June 11 to 13, 1912.

(Continued from page 1150.)

TUESDAY—*Evening Session.*

The meeting was called to order on Tuesday evening, at 8.30 o'clock, by the president, Dr. Fundenberg.

The first item on the program for the evening session was the reading of a paper by Dr. CHAS. E. WOODBURY, Council Bluffs, Iowa, entitled "Manipulation of Gold Foil."

[This paper is printed in full at page 1203 of the present issue of the COSMOS.]

Discussion.

Dr. O. L. HERTIG, Pittsburgh. This is the most scientific and most exact paper on this subject that we have ever had in Pittsburgh, and can be profitably perused from beginning to end. It is odd that the dental profession at large should become once more awakened to its responsibilities as regards the gold filling operation. The wits of the dental inventors and operators have been at work for the past twenty years devising schemes and makeshifts whereby our operations can be made easier. As a result, various schemes have been offered to supplant the gold filling. At present we are busily engaged in placing gold inlays, which are by far the best substitutes we have yet had, but time only, the arbiter of all things, will in the near future determine their proper place. The relative position which the malleted gold filling occupies in regard to other dental operations is highest, and this form of filling is to my mind the most important item of operative dentistry. As long as we have patients, we shall have carious teeth and cavities to fill, and as long as the dentist works at his chair, operations for restoring tooth structure that has been lost owing to caries and abrasion will be the chief part of his work. Therefore, while we are interested in the subjects of health and disease, we shall be primarily interested in contrivances that inventive geniuses can devise. We must not forget that our status as a scientific profession rests on our ability to restore teeth by filling procedures.

There is nothing in Dr. Woodbury's paper that can be criticized to any extent. We all employ different methods. His ideas may be successful in one mouth, mine in another, and somebody's else in another, and each one of us, by accurate and painstaking efforts, may produce good results.

The first criticism I would make concerns the application of the rubber dam prior to the preparation of the cavity, more especially the outlining of the cavity. Personally, I save time by chiseling in order to establish a rough outline of the cavity, especially at the gingival portion, going as much toward the gingiva as necessary, thus preventing the possibility of piercing the rubber dam after it is in place.

The essayist says that we should have an assistant, and he says this in a rather dogmatic way. Physiology teaches that we should have wives, but I know lots of old bachelors who will take issue therewith. I myself am a dental bachelor, inasmuch as I have never had an assistant, except for large operations, where I have availed myself of the kindly assistance of my wife in malleting. This is not the help of a trained assistant, but it is a question in my mind as to whether or not such an assistant would make the gold filling operation easier.

Dr. Woodbury has assumed that we all know cavity preparation, and has passed that phase of the subject without further mention. It is very complimentary to us, I think, that, coming from the West, where the first great exponent of proper cavity preparation arose, he should presume that we know how to prepare a cavity properly. Some of us do, and some of us do not. I doubt whether any of us are as exact as we might be in that respect. The first essential in the easy placing of a gold filling consists in having the cavity shaped so that the gold will rest easily and equally upon the bottom and against the walls and in the angles of the cavity. The opposing walls of the cavity should be parallel to one another in order that the gold may be wedged against the dentin, thus holding the filling permanently in place.

In reference to placing the rubber dam and the wounding of the gingival tissues, I invariably give an after-treatment after removing the rubber dam, which consists in thoroughly washing between the teeth with hot water applied by a syringe, following this with an application of iodin. This will prevent infection, and if the cavity extends below the gum margin, and necessitates impinging on the gum, healing will ensue without infection taking place. In this way certain complications which might arise from wounding of these tissues will be avoided.

It is one of the strangest things to me that the western *confrères* have never adopted the use of heavy foils for fillings. They take infinite pains to make pellets, and have produced beautiful results, but to my mind the ideal gold for this purpose is the heavy No. 30 foil in combination with the non-cohesive gold foil. Those of you who have never employed non-cohesive gold as the base for gold fillings, as an adjunct in starting the filling, as a time-saver, and as an additional safeguard in adaptation, will make better operations by adopting this method. It does away with two-thirds of the difficulty in placing a gold filling, especially at that inaccessible locality known as the gingival third. It makes that location ridiculously easy of adaptation, so much so that you wonder whether the adaptation is perfect. The adaptation of the non-cohesive gold does not depend upon the placing of the plugger on a certain point, but consists in its condensation in bulk until a condition of such solidity is reached that the filling will remain firm and immovable.

In regard to the grasp of the instrument, I wish Dr. Black had never used the term "pen grasp." It is inappropriate, as any teacher of penmanship will tell you. It is an instrument grasp, pure and simple, and should be defined as such. It is the grasp of strength, not that of a delicate pen, and therefore that term is a misnomer. When the dental profession at large discards the idea of the pen grasp and adopts the instrument grasp, we shall know how to use the plugger.

I am glad that Dr. Woodbury has taken up this subject in such an accurate and scientific manner, and I wish again to express my appreciation of his paper.

Dr. A. S. KOSER, Harrisburg. The essayist tells us in his most able paper that the operation most frequently performed is the restoration of lost tooth structure with gold. This has been so in the past, and very likely will be so in the future, until some restless scientific genius takes up the microscope and the test tube, discovers the missing link in caries, and gives us a preventive for it. Why is it that gold foil heads the list in restorative means? It is simply because it has undergone the trials of years of experience, and has been thoroughly tested by the dental profession. When we place a gold filling in a tooth, we feel sure that it is going to give service for many years. The confidence we have in it is not so much due to our own experience, but to the evidence which we have in the mouths of patients in which gold fillings have been inserted years ago. It looks as though gold is now going to make another record for itself in another form, viz, the gold inlay. Some operators have become very enthusiastic over the gold inlay, and I have heard some say that it was equal to any foil filling, and would last just as long. It is not fair, however, that we should compare the gold inlay with the foil filling, because it will require years to ascertain its behavior. It is always a good plan when we take up anything new, either in business or in our profession, to remember that the unexpected is liable to undo the very thing that we expect to accomplish. The profession has gone through this experience many times. When we first had the phosphate filling, some operators were so enthusiastic over it that they were willing to throw away their pluggers. The same happened with the silicates, but after a few years we discovered the unexpected. We should also bear in mind the fact that gold is not a perfect filling material, and when we use it in the shape of the inlay, we combine two imperfect materials, gold and cement.

The essayist spoke of five conditions necessary for the introduction of a gold filling. The second condition is, that the cavity be supported by sufficient dentin to withstand the force of the wedging of the gold without fracturing. There is no question that by this method the essayist can introduce a very perfect filling, but I believe that many of us, while we differ a little in our technique and use a different gold and a different method of placing it in the cavity, can fill by our method many teeth with frail walls which he could not fill. He does not say anything about strengthening frail walls by lining them with cement. In a cavity with frail walls I prefer a gold that has considerable plasticity without being extremely cohesive, and which can be packed by mechanical instruments or by hand pressure. I saw last month four canines and one lateral on the labial surfaces of which nothing but the enamel wall was left; the lateral had been filled for fifteen years, and of the four canines two had been filled nineteen years and the other two eighteen years ago. With a force of twenty-five pounds, I know these cavity walls would have broken under my hands, long before I could have finished the filling. The same might be said about such heavy hand pressure in connection with several of the other conditions. If the region of the peridental membrane or the apical foramen of a tooth is inflamed, the patient would tolerate a pressure of ten or twelve pounds with a great deal more comfort than he would one of twenty-five pounds.

As a fifth condition, the essayist demands that the patient have sufficient physical endurance to tolerate the rubber dam in place for from one to two hours. The patient's physical condition we must take into consideration very often; indeed it figures largely in the determining the material with which the tooth shall be filled—along with the patient's financial means.

The essayist is to be commended on the thorough manner in which he starts the operation, especially in preparing the teeth and freeing two or three teeth on each side of the one to be filled from all deposits. In this way, if he fills one tooth on each side of the jaw, he will have cleaned almost all the teeth of the jaw after completion of the second filling. Would it not be better to clean all the teeth first, and then begin the filling?

In regard to adjusting the rubber dam, I believe that, if the essayist tried it without the aid of an assistant, he could adjust it in the same length of time as two would require. While an assistant is a great help at times, his or her presence has a tendency to make the operator dependent on another person. In adjusting the rubber dam, a little soap is a great aid, especially when the teeth are very close together; it is, indeed, surprising how easily the dam can be adjusted by this simple means. I agree with the essayist that it is a great economy of time and that usually a cavity can be prepared much better if its walls are dry. As a rule, however, I prepare the rough outlines of the cavity, then adjust the rubber dam, and cut away as much of the tooth structure as is necessary to obtain strong walls. When such walls have been obtained, I refrain from further cutting, regardless of whether the cervical border of the cavity has reached the gum line or not. Many times the cavities do not reach the gum line, but the fillings give service for many years.

It is difficult to discuss this paper without injecting one's own individuality into it. I have been using for a number of years either DeTrey's or Watts' gold in crystal strip form, employing the DeTrey or Royce plugger points with socket handles. I use the large-size handle instruments because I can get a good hand grasp on them. I have used nothing but hand pressure for twenty-five years. The gold is placed lightly in place and always condensed with a rotating motion.

I cannot understand exactly what Dr. Woodbury means by taking advantage of the elasticity of dentin in packing gold into a cavity, and I would suggest that he give a further explanation in closing the discussion. As I understand it, elasticity is that property which allows a material to resume the form that it originally had before being stretched. If the dentin is so elastic when the filling is being forced in, I do not see why the force of occlusion should not force the filling out again.

Dr. A. E. **Bard**, Pittsburgh. I wish to emphasize one point that Dr. Woodbury has made in regard to cavity preparation; that is, the difference in the teaching of the eastern and the western schools. We know that the western schools teach a more heroic method than do the eastern schools. The western schools say that we should extend the cavity margins in every direction far enough to secure immunity. By following that doctrine and shaping the cavity to a form convenient for filling, I think we shall do very much better in all our gold work.

At the last state meeting held in Pittsburgh, I think we saw the first gold inlays being inserted, and they were very crude. It has taken us five years to learn the manipulation of the different machines and investment materials, only to find that we have to take off our hats to Dr. Taggart in the end and use his original method. If we would spend the next five years in trying to verify some of Dr. Woodbury's statements, it would be a profitable task. I would suggest that for the next five years we study the working of gold, following a little more closely the technique of Dr. Black.

Dr. I. N. **Broomell**, Philadelphia. Thirty years ago, on the first of April, I became associated with a private preceptor for the purpose of taking up the study of dentistry. One of the very first things he did was to hand me a book entitled "Harris' Principles and Practice of Dental Surgery." I have forgotten the exact date, but I think this book was published in 1849 or thereabout, and one of the first things I was asked to do was to read up on the subject of the manipulation of gold foil. If I remember correctly, the chapter on manipulation of gold foil contained about the same subject-matter that we have heard tonight. I do not mean to detract for one moment from the essayist's paper, but it seems to me that it is simply a repetition of what we have been hearing for the last thirty or forty years, and what our predecessors heard many years before that. It does not seem right to me that a dental society should give up the whole evening to the discussion of how to manipulate gold foil. Certainly, if we do not know by this time how to treat this precious metal, we never will. I am firmly convinced that we are losing time by devoting a whole evening to this almost worn-out subject.

Notwithstanding the fact that our friend from the West has presented a good many scientific ideas, the most forcible argument that we can derive from his paper is one favoring the gold inlay or some other means for preserving teeth. If I were compelled to fill teeth by the set rules as laid down by the essayist, I am sure I should fail completely. If I must measure the force of every blow, if I must move the plugger a fraction of a millimeter to the right or left; if I must take all these factors into consideration, I am sure that my nervous system would give out, and my patients would die of exhaustion.

The essayist's remarks appeared to me somewhat inconsistent. He tells us how much care is required in the technique, the force of the blow, the manipulation of the instruments, etc., yet he is careless enough to state that, before he adjusts the rubber dam, or before he works on an individual tooth, he cleans one or two or three teeth on each side of that one tooth. It seems to me that it would have been very much better if he had said that he cleansed all the teeth first and then began the operation.

Dr. WOODBURY (closing the discussion). I am sorry that I have come to you over a thousand miles with such a worn-out subject. Yet, to me, this subject seems very pertinent. In traveling many thousands of miles for the purpose of presenting this and similar subjects, I have found that the average dentist does not practice along correct or scientific lines. Though this subject be old, it is one that is much neglected; many operators who have once studied these methods have forgotten them long ago, and therefore this topic, while it is not new, is very important, as it is much misunderstood.

The elasticity of the dentin has been spoken of by one of the speakers; it is one of the most elastic substances. In forcing the gold against the dentin, it is compressed to a certain extent, hence if compressed in an oval or round cavity, the dentin would have a tendency to throw the filling out of the cavity, but when we compress the dentin between two parallel walls, it simply holds the filling more tightly.

I omitted all phases of cavity preparation entirely, for the reason that my paper is long enough as it is.

Dr. Black never claimed originality for all that he has taught in regard to this work. He is simply a compiler. He has collected the ideas of others, added his own, and systematized them for our use. He has never claimed that he is the originator of all these thoughts.

I wish to thank this society for the kind reception which the majority of the members have accorded my paper. If there had not been one little discordant note in the meeting, I should have been somewhat disappointed. The idea of the operator exhausting the nerves of his patients and his own is entirely erroneous, and only proves that such an operator is not an adept in the manipulation of gold foil. If he were, he could manipulate his instruments without exhausting the patient or himself.

About a week before coming here I inserted a filling for a woman who is a neurasthenic. The making of the filling consumed two hours' time, the filling being one of the largest I ever made, and requiring fourteen sheets of gold. The mesial surface of the first molar, almost the entire occlusal surface and the mesiobuccal cusp had to be restored. When I had finished, I told the patient that I would read a paper on the manipulation of gold foil soon, and expected to be criticized for the pain which such operations as the one I had made caused the patient, and that I should like to have her make a statement which I might repeat at the meeting. She said: "It did not hurt me very much. I dozed off several times during the operation." That is my experience. I have not found my method of manipulation exhausting, and I have practiced dentistry almost as long as Dr. Broomell, *i.e.* twenty-five years. For fifteen years of that time I have practiced dentistry according to Dr. Black's methods, and am still able to attend dental meetings occasionally, and work all the time when I am at home.

The next order of business for the evening was the reading of a paper by Dr. H. E. S. CHAYES, New York, N. Y., entitled, "Let There Be Light."

The meeting then adjourned until Wednesday morning.

WEDNESDAY—*Morning Session.*

The meeting was called to order on Wednesday morning June 12th, at 9.30 o'clock by the president, Dr. Fundenberg.

The first order of business was the Report of the Educational Council, by Dr. H. E. Friesell.

REPORT OF COMMITTEE ON PRESIDENT'S ADDRESS.

The next order of business was the report of the Committee on the President's Address, by the chairman, Dr. H. E. FRIESELL, as follows:

Your Committee on the President's Address begs to make the following report:

In general the address contains advice and suggestions which, if they could be carried out, would no doubt meet with the approval of all members of the society, and be to the best interests of all concerned.

We would most urgently approve of the following features:

That the matter of dividing the state into districts, and that of devising another system of selecting the Council, shall both be referred to the Committee on Reorganization for investigation and report at a suitable time in the future.

Concerning the question of the place of meeting, the committee approves of the recommendation so far as Philadelphia and Pittsburgh are concerned, but would suggest that each third year the meetings be held in some suitable place in the interior of the state.

We heartily and especially approve of the recommendations regarding public dental services, because of the broader suggestion, including as it does all institutions of a public or semi-public nature, and of the demand expressed that this work and inspection be in the hands and under the control of ethical dental practitioners.

The committee recommends that reorganization of the National Dental Association should be encouraged along the lines that promise greatest efficiency in securing a thorough organization of the dentists throughout the country.

That clause which refers to the establishment of a "Dental Relief Fund" has the most hearty approval of the committee, and we would urge that the treasurer be instructed to set apart the amount suggested, viz, 10 per cent. of all dues received, beginning on January 1, 1913.

Finally, the suggestion that a list of the component societies, with the addresses of the secretaries thereof, and such other data as might prove of interest, be included in the published Transactions, meets the approval of the committee.

H. E. FRIESELL,
I. N. BROOMELL,
ALFRED P. LEE,
Committee.

Motion was made and carried that the report be accepted.

Dr. A. P. LEE. Several years ago a motion was made that the charter members of this society be made honorary members. The list of charter members at that time was somewhat defective, and unfortunately Dr. Templeton was omitted from the list, and I would move that we make Dr. Templeton an honorary member at this time.

The motion was carried.

Dr. Kratzer. I move you, Mr. President, that the list of members of the society be published in the program next year, including both the active and honorary members, as has been the custom in the past. I do not know why it was omitted this year, but I am sure that we all consider it a valuable addition to the program.

The motion was carried.

The next item on the program as announced by the President was the reading of a paper by Judson Daland, M.D., Philadelphia, entitled "Oral Sepsis from a Physician's Standpoint."

[This paper is printed in full at page 1221 of the present issue of the Cosmos.]

Discussion.

Dr. I. N. Broomell, Philadelphia. This society is surely to be congratulated on having this subject brought to the attention of its members in such a forceful way, and by a gentleman so well qualified to treat it from the standpoint of the medical practitioner.

Professor Daland has championed this good cause for a long time; he has dwelt upon it in his hospital work at the Medico-Chirurgical College, and no doubt insists that due consideration be given to it in his private and consulting practice. Any physician who will stand up for such principles as he has laid down is, I believe, offering the best possible advice to humanity, and is suggesting a plan of action which must to a great extent be carried out by the dentist.

The essayist has told us of the possibility of gland infection and inflammation, adenitis, of complicated multiple joint affections, especially inflammations of these parts due to oral sepsis, and even goes so far as to claim that the endocardium and valves of the heart may undergo pathologic and degenerative changes owing to untoward oral conditions.

I am sure that these statements have been made after careful investigation and positive evidence that they are justifiable.

No less an authority than Miller, in a series of articles on this general subject, wrote in 1891 as follows:

> During the last few years the conviction has grown continually stronger among physicians, as well as dentists, that the human mouth as a gathering-place and incubator of pathogenic germs performs a significant rôle in the production of varied disorders of the body, and that if many diseases whose origin is enveloped in mystery could be traced to their source, they would be found to have originated in the oral cavity.

In his investigations Miller found over fifty varieties of micro-organisms in the mouth, about two-thirds of which were pathogenic or ready to become so under favorable conditions.

It has been demonstrated that tubercle bacilli are frequently found in the mouths of those not tubercular, and that these may result in disaster through open root-canals or diseased alveoli; or that they may be swept to the stomach and intestines, and finally in this way be taken up by the circulation.

Perhaps there is no other disease condition in the mouth more likely to favor the absorption of bacterial products than pyorrhea alveolaris, this being especially true, I believe, when the patient is undergoing treatment for this disease. During treatment the pyorrheal pockets frequently become temporarily closed, thus favoring absorption of the bacterial poisons and the escape of bacteria into the blood-stream.

Considering the possibility of all these more or less serious complications through the absorption of septic material from the oral cavity, it becomes our duty to reflect how best to overcome it. Should our treatment be operative or therapeutic—or both? In this respect I am of the firm opinion that much more can be accomplished by operation than by drugs in the form of local applications and mouth-washes. I do not mean to say that every condition in the mouth can be successfully treated by mechanical or operative procedure, but in perhaps ninety per cent. of cases this is true, in my opinion. I am not sure that pathogenic bacteria have ever been discovered in a perfectly healthy mouth, because it is not likely that investigation would be made in such cases, and then surely, in a normal mouth with normal saliva, we should not expect to find them in any great numbers. But picture a mouth having inflamed gingival margins, resulting from carelessly placed and carelessly finished fillings, carelessly adjusted crowns or clasps, or calcic deposits, any one or all of which would interfere with the normal functions of the mucous membrane and encourage bacterial growth! Or picture a case with active caries and jagged cavity margins, irritating the submucosa, and in some instances the periosteum! These are the cases in which the pathogenic bacteria appear, multiply, and finally become a serious menace.

In most of the cases alluded to, the removal of the exciting cause will result in the disappearance of the pathogenic state. If the jagged edges are smooth, the calcic deposits removed, the ill-fitting crowns or clasps adjusted or readjusted, the parts will, in the majority of instances, return to health without the aid of drugs.

I am not exactly opposed to therapeutic measures in these cases; they may be of some help in a psychological way, just as I believe a large majority of the drugs prescribed by the physician are of some aid. I have little or no use for the average mouth-wash. I believe these preparations to be about as potent as a hair restorer or a magic ring for the cure of rheumatism. In making this statement I do not mean to infer that there are no mouth-washes which contain the proper ingredients to make them act as they are expected to act, but their weakness lies in the fact that they are so promptly eliminated. In other words, they are not in contact with the parts upon which they are intended to act for a sufficient length of time to be of any positive value.

It is not often that I give a testimonial for a mouth-wash, because I know this would be regarded as unethical and unwise, but I am going to disregard this unwritten rule, and testify to the merits of one particular mouth-wash, because it is better than any other on the market today. I have no shares of stock in this to influence my boosting it, neither do I distribute it to my patients in the form of attractive samples, so you can see that my recommendation is made solely on the merits of the product. I shall recommend this mouth-wash, first, because I know it to be an antiseptic, a germicide, an alkali, an aid to digestion, and it is even reputed to prevent or retard caries of the teeth. It combines all these good features without containing one ingredient that is in the least harmful to the delicate structures of the mouth. Its action is both physiological and chemical. There are, however, one or two drawbacks to this mouth-wash; it is not always the same. While it is mostly alkaline, it sometimes changes and becomes strongly acid, and frequently the receptacle in which it is kept is at fault, being unclean both inside and out, thus changing the good qualities of the mouth-wash. These two faults may, however, be overcome with a little care on the part of the manufacturer, whose attention has been repeatedly called to it.

Knowing all this to be true, I do not hesitate to indorse publicly this product, which, however, is not in the public market as yet; it is nature's mouth-wash —the human saliva.

My remarks therefore, as were those of the essayist, are in the nature of a plea for normal conditions in the mouth; and of all the callings which have to do with the preservation of health in the various parts of the human body, the work of the stomatologist is perhaps, taking all things into consideration, the easiest of accomplishment, or at least it should be. We have the advantage over nearly all other specialists of being able to see to a great extent, with the unaided eye, all the various conditions as they are presented to us. Few of these conditions are mystifying or obscure; nearly all are readily diagnosed, and in most instances may be successfully treated.

All of this comes under the movement of oral hygiene so widely agitated, which, if carried out to the full extent of its possibilities, would mean the eradication of nearly all, if not all, of the distressing complications outlined by Professor Daland.

Dr. T. A. **Hogan**, Pittsburgh. The essayist's paper gives evidence of thought, observation, and investigation, and has been presented in such a splendid manner that it should arouse the dental profession to a full realization of this menace to our national, mental, and physical health. The far-reaching effect of oral sepsis can scarcely be conceived. That it does affect the mental, moral, and physical efficiency of the individual inversely has been shown through the experiments of Dr. Ebersole of Cleveland, and likewise by many prominent men of the country. Many cases come under our observation daily, showing us the baneful effects of oral sepsis and the beneficial effects of oral hygiene and prophylaxis.

Some time ago, Dr. Friesell reported the case of a woman who was confined in the Mercy Hospital of this city. She had a persistent abscess—I designate it as such, because of the failure of the different forms of treatment applied to it by physicians and surgeons of the hospital. Dr. Friesell was called into consultation, and after an examination discovered a decided septic condition of the mouth. After temporary prophylactic treatment, there was immediate improvement, and after subsequent treatments the patient was discharged as cured.

The essayist's remarks also apply to pathological dentition, to which so many of the ills of infancy are charged, and many of which I think might be more properly charged to oral and intestinal sepsis. Since oral sepsis operates in so many directions and embraces the entire gamut of contagious diseases, it is almost impossible in a limited discussion to touch upon it in a more than general way. The pursuit of happiness being the highest aim of the human race, we must bear in mind that happiness without health is wellnigh impossible. The higher the degree of health, therefore, the greater the degree of happiness, and anything that will obliterate disease and help to maintain a high standard of health should appeal to us seriously. Since health and internal and external bodily cleanliness and oral hygiene are concomitant subjects, dentistry will not have attained its highest mission until the doctrine of oral antisepsis has been taught and preached not only by the dentist and the physician, but by every preacher from every pulpit in every part of the civilized world.

Dr. J. J. **Moffitt**, Harrisburg. It is a pleasant sensation for any man to realize the importance of his work. Dr. Daland, in his very interesting and able paper, has emphasized not only the importance of our work, but also its great responsibility. We no longer examine the mouth to see what fillings or bridges we can insert, but we endeavor to anticipate all the septic conditions which may there arise, and warn our patients so that they may guard themselves against any such conditions. The manifestations of infection indicating a septic condition of the mouth are alveolar abscesses, empyema of the antrum, and pyorrhea alveolaris. Concerning pyorrhea, we do not know what germs cause this condition, and Dr. Daland has cited a case in which pyorrhea caused numerous boils to appear. The germs we find in this disease are the various forms of leptothrix, the fusiform bacilli, and various spirilla, while the germs that cause boils are usually the streptococci and staphylococci. A person can have boils and recover without undergoing any dental treatment whatever. It is therefore of much interest to know what germs caused the boils in the case of the patient referred to by the essayist, and to learn whether any method can be devised to controvert the action of these germs.

I have been looking forward with great interest to finding out how the physician's standpoint in regard to oral sepsis would differ from that of the dentist. Not having had an opportunity to read this paper beforehand, I am very much handicapped in discussing this subject, which seems to treat oral sepsis more from the bacteriologist's than from the physician's standpoint. As Dr. Daland says, the ordinary physician does not examine cases bacteriologically.

As an illustration of that, a short time ago a lady came to me to have some cavities filled in her anterior teeth. She said she had neglected her teeth because of neuralgic conditions and various systemic troubles, and they were in a very bad condition. During the course of conversation it developed that she had been in consultation with several physicians concerning her neuralgic condition, had been taken to New York and had photographs made of the frontal sinus and the anterior portion of the brain in order to discover the cause; in addition, she had undergone several operations in an attempt to correct her condition. In examining her mouth I found that she had ten or twelve teeth with cavities and all in a more or less septic condition. In excavating these cavities and preparing them for fillings, I found pulp-stones induced by this septic condition; altogether the complications found were causing a good deal of trouble. After the pulp-stones were removed and the cavities filled the patient experienced a great deal of relief, and I began to think that probably all her trouble was due to this cause, which has since proved to be true. If her physicians in the first place had examined this patient's mouth, and had referred her to a dentist, she probably would have escaped a great deal of trouble and expense. It is therefore our duty not only carefully to examine our patients, fill their teeth, put their mouths in proper hygienic condition, and give them the benefit of a perfect masticatory apparatus, but by proper instruction and proper restoration and regulation to enable them to keep their mouths of their own accord in such a hygienic condition as to save themselves from a great many of the septic conditions to which Dr. Daland has referred.

Dr. J. F. BIDDLE, Pittsburgh, Pa. I am sorry that, excepting Dr. Broomell, the essayist did not accord the discussers the privilege of reviewing his paper, in order that we might have had the opportunity to give this subject deliberate and reflective thought, such as the character of the essay demands, before discussing it.

Many of the micro-organisms found in the mouth, while not breeding disease in the oral cavity, are capable of producing great havoc when transferred to various parts of the body. Diseases of the eye, ear, and nose, and general derangement of the alimentary tract are quite frequently due to their presence. Often stomach disorders which have withstood all known treatments have been relieved after the oral cavity has been placed in a thoroughly healthy condition.

Recently a case has been recorded of a boy of fourteen, suffering from tubercular bone and skin disease. The physician in charge had tried for months to relieve a sore on the forearm just above the wrist, but without success. The boy's teeth were in a terrible condition, but the physician disregarded them, and finally the patient was compelled to seek dental attention. It was found that his teeth contained many cavities and three putrescent pulps. As the treatment of his teeth advanced, the patient's condition improved, until simultaneously with the removal of the last putrescent pulp in a first molar, his arm healed, and, while the boy was not cured of his tubercular trouble, his condition was much improved.

Take the operation that is so fashionable at the present time, appendicitis. Consider the number of people whom you know that have their appendices removed. In how many cases, do you suppose, was the patient prepared for the operation by having the gateway to the alimentary tract placed in a thoroughly healthy condition? Doubtless, if this precaution were taken, we would not have so many cases in which the operation was a success, but—the patient died!

Recently I was called to a hospital to extract two loose teeth for a patient who had been confined to bed for five weeks with stomach and nerve disorders, aggravated by a broken shoulder and cataract in both eyes. In the morning she had informed her physician that she had two loose teeth which she believed were irritating her nerves and retarding her progress. Upon examination, I found all her teeth, both upper and lower, numbering fifteen, each seemingly having its own little cesspool, exuding pus into the oral cavity.

The dental profession has awakened to

the value of asepsis in the oral cavity, and I am glad to see that the medical profession also is awakening, although the general medical practitioner as a rule does not accord to the oral cavity a degree of importance proportionate to its relationship to the conservation of health. I have been inquiring for some time of people whom I know to be under medical attention for stomach disorders, whether any examination had been made of their oral cavities, and I have heard of but two cases, among possibly two dozen, in which the physician deemed any such examination necessary.

In our dental colleges, the faculty embodies medical practitioners who teach certain branches in which we recognize their proficiency, but I think one of the greatest needs in the medical colleges of today is the establishment of chairs for the teaching of oral conditions from a dental standpoint. Until such instruction is incorporated in the medical schools, their graduates will not be able to diagnose intelligently septic conditions of the oral cavity.

Our essayist has shown himself to be a progressive, and not a "standpatter." He has given us a number of valuable suggestions from the medical point of view, and I have endeavored to supplement his remarks with a few observations from the dentist's point of view.

Dr. S. M. STAUFFER, Pittsburgh. Dr. Daland has undoubtedly presented to us a subject that has been in the minds of the medical and dental professions for many years, viz, the important rôle which mouth infection plays in the welfare of the human body. What is the depth of the oral cavity? As we have been looking at it, it is no deeper than four inches; in reality its depth measures thirty-two feet, and upon realizing this fact, we begin to comprehend fully what the essayist means by oral sepsis. We cannot clean one end of a tube, and expect to have the whole of it clean.

What is the cause of oral sepsis? It is not due to purely local conditions, but depends very largely, if not entirely, upon the condition of the entire alimentary tract. In fact, septic conditions of the alimentary canal undoubtedly are the primary and principal causes. How shall we correct these conditions? By limiting our treatment to the oral cavity? Most emphatically, no! Rather by going farther, and preventing the fermentation and decomposition of foods in the entire alimentary canal. How this can be accomplished is a problem which this assembly should study much more carefully than heretofore, in order to learn the causes of oral sepsis. Pyorrhea pockets are impossible if we keep the alimentary canal clean by preventing fermentation and decomposition throughout the stomach and bowels. I should like to see this society take up a more accurate study of this subject, and make investigations in order to fathom the depths of a condition which at present seems mysterious in some respects.

Dr. DALAND (closing the discussion). Dr. Broomell has called attention to the usual appearance of a septic mouth, with which you are all familiar, and has pointed out clearly what is meant by such a mouth. It has been long known that the pneumococcus normally inhabits the oral cavity, and it is believed by many that pneumonia is contracted not unfrequently by way of the mouth. Many organisms, however, are not as virulent when obtained from the mouth as when secured from fresh cultures.

The remarks of Dr. Moffitt in regard to neuralgia should be remembered. In neuritis with referred pains in various parts of the neck, face, and head, the factors mentioned by him must not be overlooked and an early diagnosis is important. I agree with him that it is a common error on the part of the medical profession to overlook that source of possible trouble which is most easily seen, namely, the mouth. I believe this error to be widespread. Many medical men look for all kinds of disturbances in remote parts of the body, while the real cause lies within the range of vision. I agree also with the remarks made by Dr. Biddle, and believe with him that the undergraduate in our medical schools should receive regular instruction in that portion of dentistry which particularly pertains to medicine, because there are bonds between medicine and that specialty of medicine and dentistry. I agree with him that a certain number of lectures should be given yearly to the undergraduates in regard to the mouth in relation to general disease.

As to the remarks made by Dr. Stauffer, I ventured to hint in my paper at the advisability of this society arranging for a symposium upon the relationship of the mouth to intestinal poisoning. It is a matter of extraordinary strangeness what remarkable care is given to the preparation of milk up to the time when it reaches the house, every possible precaution being taken that it shall be pure; then, without a moment's hesitation, such milk is passed through mouths the condition of which one hates to contemplate. The moment pure milk passes through a septic mouth it is contaminated with germs of putrefaction and fermentation, and it is not at all difficult to understand how at that point a very dangerous change may be initiated.

I believe it is well within the province of your society to take up the serious study of this subject and to solve it authoritatively.

Dr. WEAVER moved that a vote of thanks be extended to Dr. Daland for his valuable contribution to the society.

The motion was carried.

ELECTION OF OFFICERS.

The next order of business before the society was the election of officers for the ensuing year, which resulted as follows:

President—Dr. C. V. Kratzer, Reading.

First Vice-president—Dr. H. S. Seip, Allentown.

Second Vice-president—Dr. J. G. Lane, Philadelphia.

Treasurer—Dr. W. A. Spencer, Carbondale.

Recording Secretary—Dr. L. M. Weaver, Philadelphia.

Corresponding Secretary—Dr. Geo. E. Schlegel, Reading.

Executive Council—Dr. V. Cochran, C. E. Peters, and C. O. Booth.

Board of Censors—D. B. Williams, C. M. Bordner, R. J. Seymour, K. S. Perry, and A. E. Bard.

Dental Examiners—Nominations: Drs. T. A. Hogan, Pittsburgh; A. H. Reynolds, Philadelphia; A. W. McCullough, Pittsburgh, and W. H. Fundenberg, Pittsburgh.

Dr. W. L. FICKES made a report on behalf of the Local Committee of Arrangements.

Motion was made and carried that the report be received.

Motion was then made and carried to adjourn until Thursday afternoon.

(To be continued.)

THE DENTAL COSMOS

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Devoted to the Interests of the Profession.

EDITED BY

EDWARD C. KIRK, D.D.S., Sc.D.

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PHILADELPHIA, NOVEMBER 1912.

EDITORIAL DEPARTMENT.

"FESTINA LENTE!"

IN our June issue we discussed, albeit with some feelings of trepidation, the problem of "The Dental Nurse." Trepidation, because the subject is fraught with pitfalls for the unwary, growing out of traditional antagonistic attitudes of mind toward the various activities now claiming public notice and collectively designated as the movement for the emancipation of woman, or the equal rights movement, etc., etc., and it goes without the saying that the discussion of the problems arising in connection with this movement are hampered and hedged around and about by the antagonisms of tradition, hereditary prejudice, and unadulterated emotionalism. But, notwithstanding these inhibiting influences, the problems referred to are pressing for solution, and no one who intelligently reads the signs of the times can doubt for one moment that they will eventually be solved.

In the DENTAL COSMOS for June we called attention to two major objections that have been urged against the recognition of the dental nurse, the first one being on the grounds of her sex. This objection we believe is untenable and is practically disposed of by the unquestionable fact that she is not only capable of doing the work that a dental nurse is called upon to do, but that by the very reason of her sex she will be able to do that work better than it can otherwise be done.

The second objection urged against the dental nurse is that by granting her a legalized status a class distinction in dental practice would be created that would open the door to abuses and tend to belittle the status of the dental degree. In the discussion of this objection we took the ground that it would appear to be perfectly possible and feasible to legally safeguard the more general qualifications of the legalized practitioner from encroachment by the dental nurse, or by those who might attempt to practice dentistry under the limited qualification that would be required for the dental nurse. We offered no specifications in a legal way as to how such restriction of the activities of the dental nurse to her proper field of labor might be secured. The formulating of a measure to be enacted into a law that would effectively accomplish the purpose in question is a problem which could only be solved by the intelligent co-operation of a skilled lawyer, aided by the advice of those experienced in the practical problems of dental legislation.

A bill constituting the draft of a proposed act to amend the law regulating the practice of dentistry in the commonwealth of Massachusetts has been prepared for the definite purpose of creating and legalizing the sphere of activity which it is proposed shall be assigned by law to the dental nurse. We know of no other similar proposed act, and consequently the Massachusetts effort becomes important in that it may establish a precedent for subsequent legislation in other commonwealths upon the same subject. In reading the proposed act one is struck at the outset with the almost insuperable difficulty of formulating a definition which shall clearly limit the activities of the dental nurse to the more or less indefinite field of activities to which it is proposed to assign her. The Massachusetts bill in making this attempt endeavors to accomplish its purpose by a negative definition. It specifies (Sec. 2) that "No dental nurse shall be licensed to perform any service other than the examination, wedging, and cleansing of teeth, inserting and changing dressings in teeth for the relief of pain, and assisting a registered dentist during the performance of his dental operations. The above service shall not include the treatment of the disease known as Riggs' disease, nor the removal of deposits from teeth occurring in the tooth socket, nor the preparation of cavities for filling, nor the treatment of pulpless teeth. The removal of tartar under the gums is included in the cleansing of teeth." The bill provides that no registered dentist shall have at one time more than one registered dental nurse in his employ, but that "Any number of dental nurses may be employed by any of the public educational or charitable institutions of the state approved by the Board of Registration in Dentistry." A system of espionage is provided for, so that "Any member of the Board of Registration, or its agent, may at any time visit any office or institute in which a licensed dental nurse shall be employed, and make such examination as he shall see fit in order to determine whether the provisions of the laws regulating the practice of dentistry and dental nursing have been complied with." Revocation of the license of the dental nurse is provided for as follows: "The board may, after a hearing, by vote of a majority of its members annul the registration, and without a hearing may annul the registration and cancel the license of a dental nurse who has been found guilty of a crime or misdemeanor."

The essential weakness of the proposed bill is to be found in Section 2, in which an attempt is made to define the range of activities of the dental nurse. It must be self-evident that the definitions of the field of work of the dental nurse as embodied in the foregoing quotation from that section are quite capable of a much broader construction of meaning in a practical sense than was doubtless intended by the framers of this bill; and that they were consciously or unconsciously cognizant of this essential weakness in the measure seems to be evident from the remarkable provision which they have introduced providing for official espionage of the activities of the dental nurse. It is hardly to be supposed that any self-respecting practitioner would be willing to employ a dental nurse registered under the provisions of the proposed act if by so doing he would render himself legally liable to the unannounced visits of an agent of the Board of Registration authorized by law to make such examination "as he shall see fit," in order to determine whether the laws regulating the practice of dentistry and dental nursing have been complied with, nor does it seem to be physically possible that even with the system of espionage which the bill provides, any oversight of the work of any large number of dental nurses could be so effectively carried out in practice as to prevent the ambitious or unscrupulous from doing any dental operation whatsoever.

It is proposed to prohibit the dental nurse in Massachusetts from treating Riggs' disease. What beneficent end was hoped to be accomplished by preventing the nurse from attempting to cure Riggs' disease does not appear in the text of the bill. Is it perhaps the expression of an unnamed dread that by some occult means her attempts might in God's providence be crowned with more success than has heretofore signalized the efforts of the average practitioner? And, in view of all that we now know about the variety of inflammatory disorders that lead to loss of teeth from destruction of their retentive tissues, what in the name of modern scientific pathology *is* Riggs' disease, anyhow? Everybody has tried to cure Riggs' disease, with varying results; why not let the dental nurse have a try?

The proposed measure appears to be both deficient and inadequate, and is open to the still graver objection that in its present form it appears to be an open door to the exercise of the rights and privileges of the dental license without the necessary and required evidences of qualification. We believe that a proper and restrictive bill to cover the field of activities of the dental nurse can be drawn, and because of the field of usefulness which can best be filled by a trained dental nurse we believe that it should be drawn, but for the reasons herein referred to we are of the opinion that the proposed Massachusetts measure is dangerously deficient, and that its enactment into law should be prevented not only for the sake of the public interest and the interests of dentistry in the commonwealth of Massachusetts, but for the more general effect which its passage would have by creating a bad legal precedent, which would undoubtedly tend to further similar legislation in other states.

THE NEW DENTAL INSTITUTE AT BERLIN.

On October 29th the new Dental Institute of the University of Berlin was dedicated to its uses with appropriate ceremony. The completion of this great edifice, which we are assured by our German friends is a superb building representing the last word in construction for such a purpose, is the culmination of a movement of more than passing or local interest. The conception of a great dental institute of commanding importance conducted under the administration and fostering care of the University of Berlin, we are assured, originated in the mind of the late Professor W. D. Miller, a project the development of which he furthered in every possible way, and which, though late in coming to completion, may in a certain sense be regarded as a monument to his remarkable character and influence. For that reason, quite apart from the beauty and completeness of the structure itself, everyone who knew Miller and his work, and who therefore reveres his memory, will feel a personal interest in the completion of this child of his brain. Material recognition of the part which Miller's influence and personality has played in the creation of the Institute is provided in a beautiful dedicatory memorial window to Miller on the grand staircase.

To every American member of the dental profession it will always be a satisfaction to contemplate the fact that this permanent recognition of the attainment and influence of our greatest representative will always exist in Berlin as a reminder of his career and personality, and because of his great influence both in Germany and in America, will serve to always bind the dental profession of America and Germany with a lasting bond of common sympathy. We are officially assured of the regret of those in charge of the dedicatory exercises that the uncertainty of the date of the dedication and the shortness of time at disposal prevented the earlier publication of an announcement of the exercises and the sending of invitations to American representatives to be present at the dedication of the new Dental Institute.

We congratulate not only those immediately concerned in the administration and instruction of the Institute, but our German colleagues as a whole, on this notable addition to the resources of dentistry in Germany.

DENTAL LEGISLATION.

LEGISLATION CREATING A CORPS OF NAVAL DENTAL SURGEONS.

[INTRODUCED IN THE NAVAL APPROPRIATIONS BILL, H. R. 24,565; APPROVED AUGUST 22, 1912.]

WE publish herewith so much of the recent Naval Appropriations Act as appertains to the appointment of dental surgeons to the United States navy:

AN ACT

MAKING APPROPRIATIONS FOR THE NAVAL SERVICE [ETC.].

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled:

* * * * *

That a medical reserve corps, to be a constituent part of the medical department of the navy, is hereby established under the same provisions, in all respects (except as may be necessary to adapt the said provisions to the navy), as those providing a medical reserve corps for the army, and as set forth in the "Act to increase the efficiency of the Medical Department of the United States Army," approved April twenty-third, nineteen hundred and eight.

That the appointment of not more than thirty assistant dental surgeons be, and the same is hereby, authorized, said assistant dental surgeons to be a part of the medical department of the United States navy, to serve professionally the personnel of the naval service, and to perform such other duties as may be prescribed by competent authority.

That all original appointments herein authorized shall be made by the Secretary of the navy in the grade of acting assistant dental surgeon, and all appointees to such grade shall be citizens of the United States, between twenty-four and thirty-two years of age, and shall be graduates of standard medical or dental colleges trained in the several branches of dentistry, of good moral character, of unquestionable professional repute, and before appointment shall pass satisfactory physical and professional examinations, including tests of skill in practical dentistry, of proficiency in the several usual subjects in a standard dental college course, and in such other subjects of general education as are now or may hereafter be required for admission to the medical corps of the navy.

That at the end of three years from the passage of this act all acting assistant dental surgeons who have had two or more years' service under their original appointment, as herein provided, shall undergo such physical and competitive professional examinations as the Secretary of the navy may prescribe to determine their fitness to receive commissions in the navy, and if found qualified they shall be appointed assistant dental surgeons, with the rank of lieutenant (junior grade), in the order of standing as determined by the professional examinations provided for in this act.

That after the competitive examinations provided for in section three of this act have been held, acting assistant dental surgeons thereafter appointed shall serve a probationary period of three years, and upon the completion of such period shall undergo such examinations as the Secretary of the navy may prescribe to determine their fitness to receive commissions in the navy, and, if found qualified, they shall be appointed assistant dental surgeons, with the rank of lieutenant (junior grade).

That if any acting assistant dental surgeon shall fail upon the examinations prescribed in this act he shall be honorably discharged from the naval service, and the appointment of an acting dental surgeon may be revoked at any time in the discretion of the Secretary of the navy.

That all appointees authorized by this act shall take rank and precedence in the same manner in all respects as in the case of appointees to the medical corps of the navy, and shall not exercise command over persons in the navy other than dental surgeons and such enlisted men as may be detailed to assist them by competent authority.

That all officers of the dental corps authorized by this act shall receive the same pay and allowances as officers of corresponding rank and length of service in the medical corps of the navy.

That all officers of the dental corps authorized by this act shall be eligible to retirement in the same manner and under the same conditions as officers of the medical corps of the navy: *Provided*, That section fourteen hundred and forty-five of the Revised Statutes of the United States shall not be applicable to the officers herein authorized: *And provided further*, That the dentist now employed at the Naval Academy shall not be displaced by the operation of this act, and he shall have the same official status, pay, and allowances as may be provided for the senior dental surgeon at the Military Academy.

That the Secretary of the navy is hereby authorized to appoint, for temporary service, suitably qualified acting dental surgeons when necessary to the health and efficiency of the personnel of the naval service: *Provided*, That the total strength of the dental corps, including those appointed for temporary service under this act, shall not exceed the proportion of one to each thousand of the authorized enlisted strength of the navy and marine corps: *Provided further*, That appointments issued under authority of this act may be revoked at any time, shall have no legal force or effect except for the time the temporary appointee is in active service, and shall include no right of retirement.

That all appointments authorized by this act, except the appointment of acting dental surgeons, shall be made by the President, by and with the advice and consent of the Senate.

That all laws and parts of laws inconsistent with the provisions of this act be, and the same are hereby, repealed: *Provided*, That the tests of qualifications for appointment to the said reserve corps and to the dental corps may be varied to suit the subjects of such branch of the healing art or specialty of surgery of which specialists may be required, and in the discretion of the Secretary of the navy such specialists may be grouped separately: *Provided further*, That of the dental surgeons hereby authorized to be appointed to said medical reserve corps and to the said dental corps, the whole number ordered to active duty shall not exceed the number the Secretary of the navy may deem actually necessary to the health and efficiency of the personnel of the navy and marine corps, and in time of peace the number shall not exceed the proportion of one dental officer to one thousand of said personnel.

REVIEW OF CURRENT DENTAL LITERATURE.

[*Deutsche Monatsschrift fuer Zahnheilkunde*, Berlin, May 1912.]

THE PRESENT STATUS OF PULP-CAPPING. CONTRIBUTION TO THE CONSERVATIVE THERAPY OF THE DISEASED DENTAL PULP. By Zahnarzt M. Lipschitz, Berlin.

After giving an extensive and most interesting history of the methods of pulp-capping practiced from 1828 on to the present time, the writer sets down the following axiom in regard to this conservative procedure: In all cases in which we are in doubt whether to preserve a pulp or not, an attempt at preservation is justified only if chances are entirely in favor of success. If this likelihood of success is diminished not only by the advanced condition of disease of the pulp but by other conditions, such as poor state of general health, etc., then any attempt at pulp preservation is absolutely contra-indicated. In regard to differential diagnosis, the correctness of which is most important in this connection, the following pulp diseases must be distinguished, if we expect our therapeutic measures to be justified from a scientific point of view, and to offer a fairly certain guarantee of success: **Acute septic or superficial pulpitis, acute traumatic pulp-**

itis, acute simple pulpitis, partial or total, acute purulent pulpitis, acute gangrenous pulpitis, chronic granulomatous pulpitis.

The writer then queries whether a healing of the infected pulp is at all possible, and how this healing process takes place, and cites a great many opinions of authoritative observers. He concludes that the possibility of the healing of a slightly infected pulp can hardly be doubted, and that it must be even conceded that by prolonged treatment a partial purulent pulpitis can be induced to heal. Nevertheless, he gives the conservative and no doubt correct advice that pulp-capping be essayed only in acute septic, partial simple acute, and acute traumatic pulpitis—in the last case, however, only if treatment can be instituted immediately after the exposure of the pulp. Total acute simple pulpitis and acute purulent pulpitis, even if there be only partial suppuration, require such prolonged treatment and have been successfully treated by so few investigators, that pulp-capping is absolutely contra-indicated. In acute gangrenous and chronic granulomatous pulpitis capping is *a priori* impracticable.

The general factors to be observed in pulp-capping are, first, antiseptic precautions in preparing the cavity; second, neutralizing the acids present in the cavity; third, correct diagnosis; fourth, protecting the exposed pulp against further infection, injury, and the desiccating influence of air; fifth, sterilizing the pulp; sixth, capping the pulp with a neutral material, to which sometimes an antiseptic may be added, avoiding all pressure. As an antiseptic, iodoform is recommended.

In regard to the technique of pulp-capping as applicable in the various forms of pulpitis, the following details of procedure are recommended:

In acute septic pulpitis, a dressing of concentrated carbolic acid is sealed into the prepared cavity with Fletcher cement, and is left for twenty-four hours. After the removal of the dressing, the floor of the cavity is capped with Fletcher cement. If a gold or porcelain filling is to be inserted, a thin layer of oxyphosphate cement is inserted between the filling and the Fletcher capping.

In acute traumatic pulpitis, conservative treatment is advisable only if the pulp is exposed to a small extent, and if treatment can be instituted within a few hours after the occurrence of the trauma. The cavity is washed with a from 3 to 5 per cent. carbolic acid solution or oil of cloves. If the pulp bleeds, the hemorrhage is stopped by touching with 5 per cent. carbolic acid. The pulp is then capped with Fletcher cement to which a small quantity either of iodoform, or from 2 to 5 per cent. thymol, or 5 per cent. hydronaphthol has been added.

In partial simple acute pulpitis, the food débris is removed from the cavity, and the acids neutralized with a tepid 20 per cent. solution of sodium bicarbonate, which is allowed to act upon the cavity for from five to ten minutes. A dressing of concentrated carbolic acid or oil of cloves is then applied for several minutes, the softened dentin is carefully removed, and a dressing of concentrated carbolic acid, choro-phenol, or oil of cloves is sealed in the cavity with Fletcher cement for twenty-four hours. The following day the pulp is capped with Fletcher cement, to which a small quantity of iodoform may be added.

In cases in which softened dentin has to be left in order to avoid exposure of the pulp, Miller advised moistening the cavity floor with a solution of thymol in absolute alcohol, which is evaporated by hot air, whereupon a deposit of thymol remains in the dentin, exercising a lasting mildly antiseptic influence.

In all the other forms of pulpitis mentioned above, devitalization and extirpation is advocated.

[*Journal of the American Medical Association*, Chicago, August 10, 1912.]

PHYSICAL INJURIES AS RESULTS OF HYDROFLUORIC ACID. By Dr. L. H. Branson, Iowa City, Ia.

Hydrofluoric acid compounds have within late years been frequently used for the removal of calculi from the surfaces of teeth affected with pyorrhea alveolaris, and have been both much lauded and much condemned. It is therefore interesting to dentists to peruse a disinterested treatise on the action of hydrofluoric acid on animal tissue. According to Dr. Branson's findings, when applied locally, this acid may act as such and destroy tissue, or it may be absorbed and act as a poison. The amount of tissue destroyed is great in comparison with the amount of acid used. The action of hydrofluoric acid does not stop with the escharotic effect on the surface and the tissue immediately underlying; it penetrates to the deep tissues, on which it has a most deleterious effect, as evidenced by the condition of the periosteum and synovial membranes as observed in a case in which an instructor in the chemical department of the Iowa State University, while etching glass with a 48 per cent. solution, sustained injuries to several fingers, which were excruciatingly painful and did not heal within ten weeks after the initial lesion. Hydrofluoric acid injuries, therefore, are peculiar when we take into consideration the great length of time required for resolution to take place after the involvement of a comparatively small amount of tissue. As regards the action of this acid on the animal economy in general, there is danger from the liability of shock and collapse following its external application, because of the peculiarly penetrating nature of the pain—accompanied, as it is, by most intense disturbance of the nervous system.

[*Le Laboratoire et le Progrès Dentaire*, Paris, March 17, 1912.]

LOCAL TREATMENT WITH SALVARSAN IN DISEASES OF THE ORAL CAVITY DUE TO SPIROCHETES. By Dr. J. Zilz.

Spirochetes, in company with fusiform bacilli, are invariably present in all ulcerations of the mouth, and Gerber, Rumpel, Plant, and other investigators have successfully employed salvarsan in treating such conditions. The author has used salvarsan locally in the following three groups of oral affections: First, specific disease localized in the mouth, comprising cases in which injection of salvarsan was contra-indicated by anatomico-pathological or other reasons, and in those in which it is desirable to combine local application with injection to obtain a more rapid and powerful bactericidal effect. Second, non-specific forms of oral ulcerations, including also mercurial stomatitis with positive Wassermann reaction. Third, necrosis of the pulp, disinfection of root-canal, and devitalization of pulps.

The technique of local application of salvarsan is very simple. The ulcerations, after being washed with a normal salt solution at body temperature, are painted, three times daily, if necessary, with a ten per cent. salvarsan solution in water or glycerin, or in suspension in one of the fatty oils, such as olive oil, liquid paraffin, etc. In the first group of lesions the action of salvarsan locally applied is very favorable, the spirochetes together with the fusiform bacilli being destroyed. In buccal ulcerations of the second class, local applications were found to be most effective, as evinced by a case of gangrenous stomatitis of destructive nature combined with fever, in which spirochetes and fusiform bacilli disappeared within three days. As a substitute for arsenous oxid in devitalizing pulps salvarsan acts promptly when sealed in the cavity, and produces no untoward symptoms even when left in the cavity for twenty-four hours.

[*American Journal of the Medical Sciences*, Philadelphia, May 1912.]

THE SO-CALLED "MIXED" TUMORS OF THE SALIVARY GLANDS. By Dr. L. B. Wilson and Dr. B. C. Willis, Rochester, Minn.

The present study, which is illuminated by excellent histological photomicrographs, a careful tabulation of case histories, and an extensive bibliography, covers fifty "mixed" tumors of the parotid, and six "mixed" tumors of the submaxillary glands. Most of the "mixed" tumors of the salivary glands arise in young adults. Most of them cause little inconvenience early, and surgical relief is not sought until an average period of about seven years has passed. The author's cases show no etiological relationship between the tumors and acute parotitis. Those tumors which, grossly, are hard, consisting of fibrous connective tissue or cartilage, are proliferating at the periphery only, and are usually benign. The tumors which grossly are soft, consisting largely of parenchyma of types varying from adult to embryonic, are those among which are found the malignant ones. Connective tissue and parenchymatous elements both tend to revert to embryonic type. There is little evidence that these tumors arise from proliferating adult epithelium, or endothelium. There is considerable evidence to support the theory that these tumors are mesotheliomas of embryonic origin. After fairly complete operative removal, few of these tumors recur.

[*Revue Trimestrielle Suisse d'Odontologie*, Zurich, 1912, No. 2.]

TROPACOCAIN. A PHARMACO-DYNAMIC STUDY. By Dr. Paul Guillermin.

Of the many substitutes for cocain which, since the recently renewed interest in and greatly improved technique of local anesthesia, have been offered by the chemical industry, tropacocain, or benzoyl-pseudotropin, a synthetic preparation, has been subjected by the writer to a most elaborate series of painstaking experiments on animals, from which it is to be concluded that tropacocain is an anesthetic of a power about equal to that of cocain. In two per cent. solution, its anesthetizing action is prompter and more penetrating than that of a one per cent. cocain, but the duration of anesthesia is a little shorter. In intra-spinal injection in guinea-pigs, tropacocain, like stovain, alypin, and novocain, has a chiefly paralyzing action. Anesthesia is complete, but hardly extends above the umbilicus. The action of two per cent. tropacocain upon the eye is of shorter duration than that of an equal quantity of cocain, the anesthesia is very complete, the cornea is less opaque, and the eye less movable. Mydriasis is observed after tropacocain, but less constantly and less rapidly. Tropacocain is a vaso-dilator; its action on the vasomotor center, however, is small. The toxicity of this drug is low; in the sequence of safety of local anesthetics it is to be placed after novocain, but well before stovain, alypin, and cocain. The cardio-vascular effects show tropacocain to be relatively little toxic, and free from certain disadvantages of cocain. Tropacocain, the writer concludes, in a very valuable anesthetic for daily dental practice, fairly safe to administer, rapid in action, easy to preserve, and applicable without admixture of adrenalin.

[*Journal of the American Medical Association*, Chicago, August 10, 1912.]

ACUTE OSTEOMYELITIS OF THE JAW. By Dr. W. W. Babcock, Philadelphia, Pa.

Babcock states that osteomyelitis in the young occurs in the lower jaw as well as in the long bones of the extremities, although at a somewhat later age. Its early diagnosis is to be based on the early severe systemic disturbance and the widespread involvement of the bone. The prophylactic treatment consists in drilling the bone under aseptic precautions. After formation of pus, free drainage should be employed, which should be external if there be much necrosis. No teeth should be extracted, nor should teeth which merely hang from attached mucous membrane be removed. Dead portions of bone should not be removed until entirely detached, or until new bone capable of maintaining the contour of the jaw is formed. Separated and loosened teeth with gum attachment usually become re-embedded and serviceable.

[*Correspondenz-Blatt fuer Zahnaerzte*, Berlin, July 1912.]

NEW INDICATION FOR RESECTION OF THE ROOT-APEX FOR THE REMOVAL OF FOREIGN BODIES FROM ROOT-CANALS. By Professor Williger.

The mechanical and chemical means usually available for the removal of broken broaches, burs, or reamers from root-canals have generally proved unsatisfactory. The writer therefore suggests resection of the root-apex, which he has practiced very successfully in about a dozen such cases. Resection is most easily performed in upper anterior teeth, in which the removal of a foreign body is most necessary. The tooth is opened far enough to allow the easy introduction of a straight root-canal plugger into the root-canal. Under local anesthesia and anemia the root-apex is exposed and resected as far as indicated, and the foreign body is pushed through the root-canal with the root-canal plugger or a cut-off Miller broach in a broach-holder, until it can be grasped with pincers and extracted. The root-canal is then cleaned with hydrogen dioxid, filled with oxyphosphate cement and iodoform, thinly mixed; an ivory point is dipped into the same mixture, and introduced into the canal until it appears at the root-canal opening. All excess of ivory and cement is cut off, the alveolus is sterilized, and the flap of periosteum and mucous membrane is replaced and sutured. Finally the tooth may be temporarily or permanently filled.

If a broach has been in a canal for a long time, it breaks easily in removal and must frequently be extracted in several pieces, together with a quantity of oxidized débris. In such cases the root shows dark blue discoloration.

If no granuloma or cyst is noted after incision and exposure of the root-apex, a shallow groove is burred in the bone in the longitudinal axis of the tooth with a strong, straight fissure bur. Through this groove the broach can be pushed out, grasped, and extracted. In first and second molars this method is rarely applicable. Instead, the tooth is extracted, the foreign body removed, and the tooth replanted under aseptic precautions.

Another method for the removal of foreign bodies from a root-canal consists in exposing part of the root, burring a small cavity with undercuts in the side of the root, and removing the foreign body. The cavity can be filled with amalgam, which is carefully smoothed, or with molten paraffin-thymol. An X-ray picture will always greatly aid in exactly locating the foreign body and deciding upon the most expeditious method of its removal.

PERISCOPE.

Waxing Mechanical Saws.—A little wax rubbed along the teeth of the mechanical saw that is used to cut off sprues with, will make the saws run smoothly and cut in a truly astonishing manner.—A. G. SMITH, *Pacific Dental Gazette.*

Surgical Treatment of Cleft Palate.—In complete cleft of the palate with single hare-lip, the bones are closed within the first three months, preferably within the first month. The lip is closed from four to eight weeks later. The soft palate is closed at from fourteen to sixteen months of age. This applies in case of cleft palate unaccompanied by hare-lip. No material should be used for sutures that can absorb and retain secretions; only silver wire, lead plates, and horse-hair are suitable, and the results of the operation will usually be successful.—TRUMAN W. BROPHY, *Lancet-Clinic.*

Prophylactic Treatment in the Application of Arsenic.—After sealing-in an arsenical treatment, the surrounding gum is painted thoroughly with tincture of iodin. This will counteract any tendency toward sloughing in case any of the arsenic escapes, and it also lessens the liability to severe pain, as the counter-irritant effect of the iodin tends to lessen the vascular engorgement of the pulp, thus avoiding so much pressure on the sensory nerve terminals.—C. R. KRAUSE, *Pacific Dental Gazette.*

Alloy for Casting Crowns.—An alloy consisting of 95 per cent. of pure gold and 5 per cent. of pure platinum may be used for the crown casting when it is to stand alone. In case the crown is to be used as an abutment for a bridge an alloy of 90 per cent. pure gold to 10 per cent. platinum is preferable because of its greater strength and consequent resistance to the force of mastication. In the fusing of these alloys a nitrous oxid blowpipe is used in order to furnish sufficient heat to accomplish the result desired. A pressure of ten pounds is enough for the casting of crowns.—H. E. S. CHAYES, *Dental Forum.*

Treatment of Chronic Alveolar Abscess.—When every other method fails in treatment of chronic and seemingly incurable alveolar abscess, about a dram of the U.S.P. solution of formaldehyd is diluted with about four times its bulk of water. With a strong syringe this diluted solution is forced through the fistula, if there is one: if not, through the apex of the root; the tooth is left open for a day or so, then a treatment of tricresol and formalin is sealed in.—C. R. KRAUSE, *Pacific Dental Gazette.*

Construction of a Hood.—A wire measurement is obtained from around the morsal plane of the middle third of the stump, and the length of the wire is marked off upon the sheet of metal with a pair of calipers. The height of the highest point on any of the surfaces is found, and this, the width of the metal required, is marked off upon the sheet. A sixteenth of an inch is added to this width to allow for that part which is to extend beneath the free margin of the gingiva. The strip of metal thus marked off is cut from the platinum plate and the collar is formed and joined by soldering the edges with a 25 per cent. platinum solder.—H. E. S. CHAYES, *Dental Forum.*

Replacing a Tooth in a Vulcanite Denture.—If a plate has a fair amount of rubber, a tooth is selected, a space dovetailed, making undercuts as for a filling, the tooth is put in position, and held with the left hand. A wax spatula is heated over a Bunsen burner, and some low-fusing alloy—one that will melt in boiling water and is used for dies—is melted and with a pointed, hot spatula forced into the cavity, and polished at once. I have had repairs made in this way hold for two years, and probably longer. They will hold if the vulcanite is of sufficient thickness, and with a little experience require very little time.—G. H. Henderson, *Pacific Dental Gazette.*

Requirements for a Hood.—The metal used for a hood must possess the following qualities: (1) Resistance to disintegration by fluids of the oral cavity. (2) It must be of at least a third again as high a fusing-point as pure gold. (3) It must be almost equal to pure gold in ductility. (4) Its molecular strength must be such as to resist tearing even when very thin. (5) It must be as pliable as pure gold and quite as adaptable. (6) Last but not least, the toleration of it by the tissues must be beyond question. A 38-gage sheet of pure platinum answers all these demands ideally, and we will use it for the purpose of constructing our hood.—H. E. S. Chayes, *Dental Forum.*

Cementation of Inlays.—Great care should be exercised in this particular feature of inlay work. Many inlays are allowed to become failures because of the fact that the operator uses a cement totally unfit for this purpose. We should have a cement the granules of which are very fine, for there are some cements on the market the granules of which measure about 0.05 of an inch. If, however, a cement of proper consistence is used, and a portion of the cement is smeared in the cavity as well as on the inlay, and the inlay is pressed in and held firmly, and the margins are thoroughly burnished with a smooth burnisher during the hardening process, we can expect to produce an inlay that is ideal.—T. P. Hinman, *Journ. of the Allied Societies.*

Necrosis of Jaw After Measles.—In view of the fact that many lay people still believe measles to be a trivial disease, and from the rarity of the above sequela, Bindi reports the following case: The child, aged six, developed measles on January 15th, followed by rather severe broncho-pneumonia, and later on a gangrenous condition of the upper right jaw. On February 24th, the mucous membrane was completely stripped off the alveolar margin from the second incisor up to the last molar on the right upper jaw, and the intervening teeth had either dropped out or were tottering to a fall. The bare bone was dark gray and loose. On February 27th, under light anesthesia the loose sequestrum of bone was removed, comprising the alveoli of the second incisor, canine, bicuspids, and first molar; in the upper direction the necrosis extended to half the upper maxilla, stopping at the canine fossa, the palatine area. Cancrum oris is known as a rare complication of measles, but it is very rare to find such extensive damage as is here recorded. The child left the hospital on March 4th, and was in good general health, and the large breach in the jaw was gradually filling up.—*British Dental Journal.*

Inlays as Bridge Attachments.—Gold inlays are being used constantly for attachments for bridges which are supported by vital teeth. In a great many instances these inlays have not been satisfactory. The reason for this is the fact that frequently the operator casts the inlay out of pure gold, and, as we know, cast gold has very little more rigidity than lead; consequently the inlay soon bends sufficiently to cause the cement to give way and the inlay to become loosened. These inlays should always contain either five per cent. platinum or silver. This makes them very much harder, and the inlay is more rigid when made this way. I have been using inlays for abutments for bridge work for a great many years, and have had a number of them get loose, but since I have adopted the plan of using pins in inlays, I have had very little trouble of this sort. The technique of placing the pins is as follows: In the basal wall of the cavity two openings are drilled with a No. 3 bur and parallel with the long axis of the tooth. These should be placed at some distance from each other, and extended to a depth of at least one-sixteenth of an inch into the dentin. Pins are made of 20-gage iridio-platinum wire, the tops of these being so flattened that, when the wax is pressed into position, they will adhere firmly to it. These pins give a great deal more rigidity of anchorage and prevent the lateral movement of the inlay in the cavity. I have had practically no trouble from loosening when pins were used to give additional strength for inlays in bridge anchorage.—T. P. Hinman, *Journ. of the Allied Societies.*

HINTS, QUERIES, AND COMMENTS.

SPRINGS IN DIFFICULT PROSTHETIC CASES.

I was greatly interested in Dr. W. F. Kelsey's contribution on "Springs Suggested in 'A Difficult Case for Prosthetic Restoration,'" published on page 833 of July 1912 Cosmos, and I agree with him that springs could be used to advantage in many cases were the method of their application better understood.

I have found that, in order to obtain the best results, it is essential that the swivels should be fixed with a thin washer to prevent lateral play—a little whiting being worked into the joint before soldering, to prevent the solder from working through to, and binding the swivel.

The vulcanite ridge or guard should be carried forward, around the front of and partially covering the swivel-head, thus representing practically a hollowed plumper.

Another important point in the relation of the upper to the lower swivel is the following: One usually finds that the lower swivel works best if placed a little anteriorly of the upper one, that is, not quite opposite to it. I have, however, had occasion to place the lower posteriorly to the upper in cases where the lower denture had a tendency to slip forward out of the mouth.

One point has not been touched upon by Dr. Kelsey; that is, the great use of springs in keeping down difficult lower dentures which tend to ride up and cause trouble. I have found that springs are far more useful in keeping lower dentures down than in keeping upper ones up.

Springs should be tried in, and care is to be taken that the path of the spring clears the bicuspids, and yet does not intrude upon and abrade the cheek.

In flasking the case, the shank should be pressed up to get a good hold in the plaster, and the rubber should be packed carefully so as not to start the swivel from its plaster bed; otherwise there will be trouble.

Colin Keay, L.D.S., R.C.S.Eng.
London, England.

REPAIR OF BROKEN DOWELS IN CROWNS.

Often a patient shows a broken pin in a Richmond or Morrison crown, or the dowel is broken in removing. If broken, the pin is removed from the root, another new pin is fitted into the root, and allowed to extend out about one thirty-second of an inch. With a bur a little larger than the pin the remainder of the pin in the crown, or the place occupied by the old pin, is drilled deeply enough to accommodate the new pin. The new pin is placed in position, then, after a small piece of warm sticky-wax has been placed into the hole in the crown, and the end of the pin has been warmed so as to make the wax adhere, the crown is placed in position on the root. When the wax is hard, the crown and pin are removed together; then all of the crown is invested except the surface next to the root, the investment holding the pin in position at the end. About one-half of the pin, that part next to the crown, will show. When the wax is burnt out, there will be a little space around the pin, because a bur larger than the pin has been used for grinding the hole in the crown. Small pieces of 18-karat solder are placed in this space, and, after thoroughly heating, a small flame is directed on the exposed pin; the heat will travel down the pin and melt the solder, and a new and strong attachment will result.

C. S. Burden, D.D.S.
Hogansville, Ga.

OBITUARY.

DR. CHAS. STACY STOCKTON.

[SEE FRONTISPIECE.]

DIED, at his home, in East Orange, N. J., September 9, 1912, CHAS. STACY STOCKTON, D.D.S., in the seventy-sixth year of his age.

Dr. Stockton some months ago was compelled to undergo a surgical operation, and while it resulted in a measure of improved health, he suffered from a relapse which resulted fatally on the date above stated.

Chas. Stacy Stockton was born in Springfield, Burlington county, N. J., December 17, 1836. His early education was obtained at the Pennington Seminary, N. J., from which he was graduated in 1855. He studied dentistry for a time with Dr. C. A. Kingsbury of Mount Holly, N. J., but later, realizing the necessity for a more thorough professional training, he enrolled himself as a student in the Pennsylvania College of Dental Surgery, from which school he was graduated with the D.D.S. degree, February 19, 1869.

From the beginning of his professional career Dr. Stockton took a most active part in dental affairs. His reputation as a leader and counselor rapidly placed him in the front rank of his colleagues in his native state, among whom he was regarded as the dean of his profession, a recognition to which his extraordinary abilities and activities justly entitled him. He was one of the originators of the New Jersey State Dental Society, which was organized in October 1870 in response to a call made by twenty-seven dentists of the state, Dr. Stockton's name being prominent among those signing the call, if indeed he was not the original proposer of the movement. He was one of fifteen dentists holding membership in the State Dental Society of New Jersey to sign a call for an international dental congress in 1892, which was the initial movement toward the formation of the World's Columbian Dental Congress, held in Chicago in 1893. He held membership in the Central Dental Association of Northern New Jersey, of which he was one of the organizers, in the American Medical Association, the National Dental Association, and also in several dental societies in New York city. He was one time president of his state society, and vice-president of the American Dental Association.

He took a lively interest in public affairs, being one of the prime movers for a public library in Newark, and also for the establishment of a technical school. He had been vice-president of the board of trade, in which organization he took a prominent part. He always took a deep and practical interest in the higher education, both as applying to dental practitioners and in the community at large. He was active in the effort to establish interstate reciprocity in the exchange of dental licenses, and was a frequent contributor to the periodical literature of his profession.

Dr. Stockton possessed the gift of eloquence in a marked degree, and his abilities were sought for on many occasions of prominence, where his addresses, both formal and extemporaneous, contributed much to the interest of the occasion and to the edification of his hearers. A few years ago a complimentary dinner was given to him in New York city by over two hundred of his dental friends from every part of the United States.

Dr. Stockton was a member of the Episcopal Church, and took an active part in its affairs. For two years he was president of the Y. M. C. A. In politics he was a republican, and served his party actively in various capacities.

He married, in 1857, Miss Martha Smith of Centre Moriches, L. I., who, with a son and daughter, survives him.

AT a meeting of the Central Dental Association of Northern New Jersey, the following resolutions on the death of Dr. Chas. S. Stockton were adopted:

Whereas, Dr. Charles Stacy Stockton, an honored member of this society, has been removed from us by death, it is fitting that we should make record of the event and of our sense of the great loss thus sustained; therefore be it

Resolved, That by his genial disposition, honorable character, and enthusiasm in his chosen profession he has endeared himself to his associates and won their lasting esteem and affection by his untiring efforts in their behalf and for the advancement of dental science. As a wise counselor, true friend, and earnest scholar he will never again take part in our proceedings, never again will the warm grasp of his friendly hand be felt, no more will his words of wisdom be heard, nor will his cheering smile again brighten our gatherings; therefore be it

Resolved, That our sympathies and condolence be extended to his family in their bereavement. While such a loss is irreparable, we cannot but be grateful to the Giver of all good that he was permitted to live such a long and useful life; and be it further

Resolved, That these resolutions be incorporated in the minutes of this society, and that a copy be transmitted to the family of the deceased and also the dental journals.

S. C. G. Watkins,
Chas. A. Meeker,
Chas. W. F. Holbrook,
H. S. Sutphen,
Ralph Waldron,
Committee.

DR. JOSEPH P. ROOT.

Died, suddenly, on September 4, 1912, at Kansas City, Mo., Joseph P. Root, D.D.S.

Dr. J. P. Root died at the German Hospital, Kansas City, Mo., September 4, 1912, suddenly, as the result of a strangulated femoral hernia developed while playing golf and swinging at the ball. He was born in Kansas City, Mo., on March 21, 1862. His father was J. P. Root, United States minister to Chile under President Grant and the first Lieut.-governor of Kansas.

Joseph P. Root received his early education in the public schools of Watertown, N. Y., and entered the office of C. B. Hewitt of Kansas City, his dental preceptor, in 1879. He was graduated in 1882 as D.D.S. in the first class graduated from the Kansas City Dental College. After graduation he began the practice of dentistry in Kansas City, Kans. (formerly Wyandotte), and later opened an office in Kansas City, Mo., in which city he continued in active practice until the date of his untimely death.

Dr. Root was a man of strongly individualized characteristics, a genial comrade, a loyal friend, with a large-hearted, sympathetic temperament and a keen sense of humor; he was a gifted conversationist and a brilliant orator. His literary bent early manifested itself, and in due course of time it found its legitimate outlet in his work as editor of the *Western Dental Journal.* He was a cheerful and aggressive antagonist in debate, but always fair and honorable in his treatment of an opponent. As a professional man he kept himself abreast with the best professional work of his time, and maintained his relationships with the avenues of progress in his profession, taking an active part in dental society work and in dental educational work. He was essentially a leader and a safe guide of his fellows. He held membership in the Kansas City Dental Society, the Kansas City Odontographic, the alumni association of his alma mater, and in his state association and the National Dental Association. In all of these organizations, with the exception of the National Dental Association, he had held the position of president. He was especially interested in the oral hygiene movement among public school children, in the prophylactic treatment of dental cases, and in the legislative and educative work of the dental profession.

He married, August 3, 1884, Miss Keturah Waite of Independence, Mo., who with two married sons survives him.

The void created in the dental profession by the untimely death of this lovable and capable man will not be readily filled, but the influence of his splendid example will ever remain as both the heritage of his colleagues and his own most enduring monument.

Yours J. P. Root

Society Notes and Announcements.

SEVENTH AND EIGHTH DISTRICT (N. Y.) DENTAL SOCIETIES.

Union Meeting.

On November 14, 15, and 16, 1912, there will be held what is confidently expected will be the largest meeting of the dentists of eastern, central, and western New York, as well as a number from western Pennsylvania and adjacent points in Canada. As it is two years since the Seventh and Eighth District Dental Societies of the State of New York have held a union meeting, every member of these two societies and a great number from the Fifth District Dental Society of the same state are expected to attend and help promote the interest of the occasion.

Prominent essayists and able clinicians have been secured to provide those who attend with plenty to think about on very interesting subjects and with helpful assistance which they can use in their everyday practice. There will also be an extraordinarily large exhibit by the different manufacturers from all over the country, who will bring the latest scientific methods and appliances for demonstration by men who are thoroughly conversant with the needs and requirements of dentists.

Every dentist within convenient distance should make it a point to be at this important meeting, where there will be so much to learn and see which will be useful in helping him to become a better practitioner.

E. G. Link, *Chairman,*
E. L. Schlottman,
G. C. Lowe,
M. B. Eschelman,
G. M. Hughey,
G. M. Fierro,
Business Committee.

ACADEMY OF STOMATOLOGY.

A regular meeting of the Academy of Stomatology will be held on Tuesday, November 26, 1912, at the hall of the College of Physicians, Twenty-second st. above Chestnut st., Philadelphia, Pa., at 8 P.M. Dr. George H. Wilson of Cleveland, Ohio, will read a paper entitled "Some Phases of Prosthetic Esthetics." The paper will be illustrated by lantern slides. All members of the dental profession are cordially invited to be present.

Norman L. Jameson, *Sec'y,*
1429 Spruce st., Philadelphia, Pa.

INSTITUTE OF DENTAL PEDAGOGICS.

The next annual meeting of the Institute of Dental Pedagogics will be held in Pittsburgh, Pa., January 28, 29, and 30, 1913. An unusually interesting program has been arranged, and no progressive dental teacher can afford to miss this meeting.

Fred W. Gethro, *Sec'y,*
Chicago, Ill.

CHICAGO DENTAL SOCIETY.

The officers of the Chicago Dental Society are planning a large celebration for Friday and Saturday, January 31 and February 1, 1913. The program includes two days of clinics by selected men from all parts of the country, one evening of papers by men of international reputation, concluding the two days' meeting with a testimonial banquet to our esteemed *confrère,* Dr. Truman W. Brophy of Chicago.

The dentists of Chicago will make every effort to see that the entire program will eclipse all former meetings. Any dentist who has a new or interesting clinic to give at this meeting is cordially invited to correspond with

Fred W. Gethro, *Ch'man of Clinic Committee,*
917 Marshall Field Bldg., Chicago, Ill.

OHIO STATE DENTAL SOCIETY.

The committee appointed to prepare for the holding of the forty-seventh annual meeting of the Ohio State Dental Society, in Cincinnati (Sinton Hotel), Ohio, December 3, 4, and 5, 1912, are still diligently carrying on their work.

PROGRAM.

President's Address. C. R. Converse, Springfield.

"Professional Ethics." H. C. Brown, Columbus.

"Oral Surgery." G. V. I. Brown, Milwaukee, Wis.

"Removable Bridge Work." Chas. F. Ash, New York city.

"Instrumentation in Pyorrhea Treatment." A. F. James, Chicago, Ill.

"Diagnosis of Diseases of the Pulp." Hermann Prinz, St. Louis, Mo.

Lecture, "Venereal Diseases," illustrated by stereopticon and moving pictures from actual subjects, By E. A. Deeds of Dayton, Ohio.

The medical societies before which it has been presented pronounce this lecture a wonderful exhibit. It is needless to call attention to the growing necessity for a thorough understanding of these diseases by the dental profession.

The local Oral Hygiene Committee will give a practical exhibition of their school work, having a whole school at work in its own school building, under the direction of the Oral Hygiene Committee of the Cincinnati Dental Society, giving every detail of the work, from primary examinations up to operative work.

The practical working of all the latest phases of dental radiography will be demonstrated by Dr. Sidney Lange of Cincinnati. One of the most complete outfits will be set up, and radiograms taken, developed, finished, and delivered on the spot.

The clinics will be very attractive.

F. R. Chapman, *Sec'y,*
305 Schultz Bldg., Columbus, Ohio.

MINNEAPOLIS DENTAL SOCIETY.

The annual midwinter meeting of the Minneapolis Dental Society will be held in the Masonic Temple, Minneapolis, Minn., Friday and Saturday, January 24 and 25, 1913.

For information address

O. DeForest Davis, *Sec'y,*
404 Donaldson Bldg., Minneapolis, Minn.

RHODE ISLAND BOARD OF REGISTRATION.

The Rhode Island Board of Registration in Dentistry will meet for the examination of candidates at the State-house, Providence, R. I., Thursday, Friday, and Saturday, December 26 and 27, 1912. Application blanks and particulars may be obtained from

H. L. Grant, *Sec'y,*
1025 Branigan Bldg., Providence, R. I.

MARYLAND BOARD OF EXAMINERS.

The Maryland State Board of Dental Examiners will meet for examination of candidates for certificates, November 6 and 7, 1912, at the Baltimore College of Dental Surgery, Baltimore, Md., at 9 A.M.

For application blanks or further information address

F. F. Drew, *Sec'y,*
701 N. Howard st., Baltimore, Md.

ILLINOIS BOARD OF EXAMINERS.

The semi-annual meeting of the Illinois State Board of Dental Examiners for the examination of applicants for a license to practice dentistry in the state of Illinois will be held at the Northwestern University Dental School, corner Lake and Dearborn sts., Chicago, beginning Monday, November 11, 1912, at 9 A.M.

All applications, together with the fees, twenty-six dollars, must be filed with the secretary at least five days prior to date of examination.

Address all communications to

T. A. Broadbent, *Sec'y,*
708 Venetian Bldg., Chicago, Ill.

MICHIGAN BOARD OF EXAMINERS.

The next regular meeting of the Michigan State Board of Dental Examiners will be held at the Dental College, Ann Arbor, commencing Monday, November 11th, at 8 A.M., and continuing through the 16th.

For application blanks and full particulars address

F. E. Sharp, *Sec'y*,
Port Huron, Mich.

ARIZONA BOARD OF EXAMINERS.

There will be a meeting of the Arizona Board of Dental Examiners, November 25 to 29, 1912, at Phœnix. Candidates should have in their application, and fee of $25.00 should accompany same, at least twenty days before meeting. Theoretical examination includes anatomy, physiology, chemistry, materia medica, therapeutics, metallurgy, histology, pathology, operative and mechanical dentistry, oral surgery; practical demonstration of skill in operative and mechanical dentistry will also be required, and candidates should come prepared with instruments and material for making fillings and crowns for the mouth.

W. A. Baker, *Sec'y*,
Tucson, Arizona.

NEW HAMPSHIRE BOARD OF REGISTRATION.

The next meeting of the New Hampshire Board of Registration in Dentistry, for examinations, will be held December 4, 5, and 6, 1912, at Masonic Banquet Hall, Manchester, N. H.

A. J. Sawyer, *Sec'y*,
Manchester, N. H.

NEW JERSEY BOARD OF EXAMINERS.

The New Jersey State Board of Dental Examiners will hold their regular annual meeting and examination in the Assembly chamber of the State-house at Trenton, N. J., December 2, 3, and 4, 1912. Application must be filed ten days prior to the meeting. For further particulars apply to

Chas. A. Meeker, *Sec'y*,
29 Fulton st., Newark, N. J.

IOWA BOARD OF EXAMINERS.

The next meeting of the Iowa State Board of Dental Examiners for the examination of candidates will be held in Des Moines, commencing December 9, 1912. For application blanks and particulars write

J. A. West, *Sec'y*,
417 Utica Bldg., Des Moines, Iowa.

CALIFORNIA BOARD OF EXAMINERS.

The next meeting of the California Board of Dental Examiners for the purpose of examining applicants for a license to practice dentistry in the state of California will be held in San Francisco, beginning on December 4, 1912, at 10 A.M.

For further information, address

C. A. Herrick, *Sec'y*,
133 Geary st., San Francisco, Cal.

COLORADO BOARD OF EXAMINERS.

The next regular meeting of the Colorado State Board of Dental Examiners will be held at the Capitol, in Denver, beginning Tuesday, December 3, 1912.

All applications for examination must be filed with the secretary before that date. Examinations are theoretical and practical, and applicants must be prepared to do such practical work as required.

For further particulars, address

J. L. Howell, *Sec'y*,
532 Mack Block, Denver, Colo.

WISCONSIN BOARD OF EXAMINERS.

The Wisconsin State Board of Dental Examiners will convene in Milwaukee, at the Wisconsin College of Physicians and Surgeons, on Tuesday, December 17, 1912, at 10 A.M., for examination of applicants to practice dentistry in Wisconsin.

A high-school diploma, application, and twenty-five-dollar fee must be filed with the secretary fifteen days prior to above date; dental diploma to be presented in advance of examination.

F. A. Tate, *President*,
W. T. Hardy, *Sec'y*,
422 Jefferson st., Milwaukee, Wis.

PENNSYLVANIA BOARD OF EXAMINERS.

The next examination of the Pennsylvania State Board of Dental Examiners will be held in Musical Fund Hall, Philadelphia, and at the Dental Department, University of Pittsburgh, on Wednesday, Thursday, Friday, and Saturday, December 11, 12, 13, and 14, 1912. Application blanks can be secured from the Department of Public Instruction, Harrisburg.

Alexander H. Reynolds, *Sec'y*,
4630 Chester ave., Philadelphia, Pa.

ARMY DENTAL SURGEONS.

Memoranda of Changes.

For the week ending September 21st:

Chas. E. Sherwood, act.d.s., September 4th, reported for temporary duty at Calexico, Cal.

First Lieut. John H. Hess, September 8th, left for temporary duty at Fort Huachuca, *en route* to Douglas, Ariz., for temporary duty.

Chas. E. Sherwood, act.d.s., September 12th, left temporary duty at Calexico *en route* to Presidio of Monterey, Cal.

First Lieut. R. E. Ingalls, September 3d, ordered to proceed to Forts Worden, Flagler, Casey, Ward, and Lawton, Washington, for temporary duty, instead of Chas. DeW. Deyton, act.d.s.

For the week ending September 28th:

First Lieut. R. E. Ingalls, September 15th, reported for temporary duty at Fort Flagler, Wash.

First Lieut. Edward P. Tignor, September 21st, reported for temporary duty at Fort Myer, Va.

Chas. B. Seely, Jr., act.d.s., September 22d, left temporary duty at Fort Clark *en route* to Fort Sam Houston, Texas.

For the week ending October 12th:

C. DeW. Deyton, act.d.s., left Vancouver Barracks, Wash., October 1st, for San Francisco, Cal., *en route* to Philippine Islands.

First Lieut. H. G. Voorhies left Fort Leavenworth October 6th, for Jefferson Barracks, on dental board.

First Lieut. E. P. Tignor left Fort Myer, Va., for temporary duty at Columbus Barracks, Ohio.

First Lieut. J. F. Feely arrived at Fort Jay, October 2d, for temporary duty.

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UNITED STATES PATENTS

PERTAINING OR APPLICABLE TO DENTISTRY

ISSUED DURING SEPTEMBER 1912.

September 10.

No. 1,037,962, to Bernhard C. Moll. Dental mold.

No. 1,038,063, to J. F. Alexander and W. G. Alexander. Casting device for dental purposes.

September 17.

No. 1,038,525, to Henry M. Brenenstul. Rotary tooth-brush.

September 24.

No. 1,039,235, to Harry G. Wiggins. Porte-polisher.

No. 1,039,420, to James A. MacDonald. Angle attachment for handpiece.

THE
DENTAL COSMOS.

VOL. LIV. DECEMBER 1912. No. 12.

ORIGINAL COMMUNICATIONS.

A CLINICAL REVIEW OF CERTAIN PATHOLOGICAL PHASES CONCERNING THE MAXILLARY BONES.

By **M. N. FEDERSPIEL, D.D.S., M.D., Milwaukee, Wis.,**
PROFESSOR OF ORAL SURGERY AND ORTHODONTIA, DENTAL DEPARTMENT, MARQUETTE UNIVERSITY, MILWAUKEE, WIS.

(Read before the Southern Wisconsin Dental Society, at Delavan, June 6, 1912.)

MY purpose in presenting some pathological phases concerning the maxillary bones is to encourage a deeper and more thorough consideration of diseases that affect these tissues. I am conscious that many dentists and physicians have given this subject much thought and study, and our journals are replete with reports of interesting cases; there still remains, however, much to be studied regarding a better understanding in making a differential diagnosis of the various pathological manifestations affecting the jaw-bones.

IMPORTANCE OF DIAGNOSIS.

While I do not wish to enter into a discussion of diseases involving the teeth, I must give due consideration to the many important factors that associate the teeth with the jaws. My studies along embryological, anatomical, and pathological lines, together with the many interesting cases at my weekly clinic, have enabled me to realize the dangers that may arise from a snapshot diagnosis, and to appreciate the importance of thorough, systematic examination, thereby assuring the patient of a positive cure or of correct information as to the prognosis.

DANGERS OF PURELY EMPIRICAL METHODS.

Notwithstanding our present enlightenment and our modern methods of diagnosing and treating diseases and deformities of the mouth, jaws, and face, yet empirical methods still seem to hold sway. Here, there, and everywhere we find those who are victims of the pseudoscientist, whose sole object is to make the patient believe that he is suffering from a special affliction which can only be treated by a special method, known only to himself.

AN EXAMPLE.

Not long ago I was consulted by a patient, a woman of twenty-five years, suffering intense agony in the region of the right maxillary bone. Her face was swollen to such an extent that her right eye was closed. In attempting to make a diagnosis, I obtained from her the following history:

Two weeks previous she had a bad cold; a few days later she noticed considerable shooting pain in her upper jaw-bone. She consulted her physician, who told her that she had neuralgia of the face, and gave her a prescription. The medicine gave her temporary relief, but the pain soon returned, more aggravated than before. Again she consulted her physician; he then advised her to see a dentist. She promptly called on her family dentist, who informed her that she had some trouble with her teeth, and proceeded to open the right lateral and canine, but found the pulps in both teeth to be vital. Phenol was packed into the cavity and sealed with temporary stopping. She was given a few tablets of aspirin, to be taken one each hour until the pain stopped. This gave her no relief, and she walked the floor all night, doing all she could, applying home remedies, and at the break of dawn was back to her dentist begging for relief. The stopping was removed, various medicines applied to the exposed pulps, and again she was discharged. Still the pain was at its height; her only relief came when she took large doses of medicines that her druggist gave her. Several days passed, and her face began to swell. A consultation was held with her dentist and physician, who diagnosed the case as acute empyema of the antrum, and she was then advised that relief could only be obtained by submitting to an operation. The nasal wall near the inferior meatus was punctured and the cavity irrigated. Hypodermic injections of morphin and hot compresses kept her fairly comfortable, but the swelling seemed to remain at a standstill. The patient finally consulted another physician, who referred her to me.

On making an examination by transillumination, I found the antrum clear. Upon palpation, there was a pronounced fluctuation in the alveolar cul-de-sac, in the region above the apex of the right canine and lateral. All of the anterior teeth were loose in their sockets; the occlusion was normal; the pulps in all the teeth were vital and responded to the usual test; the temperature was 102°, the patient extremely weak, the breath foul. The blood-count showed a high degree of leucocytosis. This systematic diagnosis was sufficient to indicate that there was pus from either osteitis or periosteitis of the maxillary bone. The patient was anesthetized with nitrous oxid and oxygen, and a deep and wide incision was made in the alveolar cul-de-sac; pus oozed freely. Upon probing, I found the case to be a tpyical subperiosteal abscess with superficial degeneration of bone. The area involved was thoroughly curetted and irrigated with hot saline solution, then packed with iodoform gauze. Upon awakening from the anesthetic, she was given two grains of calomel and put to bed. The next day the temperature was normal, the pain gone, and the patient was resting comfortably. The wound was dressed each day, and the fifth day the patient was discharged as cured. She was referred to her dentist for future dental work.

SUBPERIOSTEAL ABSCESSES DUE TO HYPODERMIC INJECTIONS.

Subperiosteal abscesses of the jaws are not uncommon. Let me call attention to the fact that the use of the hypodermic needle in and about the jaws will frequently carry germs which, once being embedded under the tissues, will set up and localize the condition, and the pus will burrow under the periosteum and strip it from the bone.

The prognosis in an acute subperiosteal abscess is very favorable, but frequently the abscess becomes walled-off, and chronic. This condition, if not treated, will go on destroying the bone and eventually bring on necrosis.

NECROSIS, AND RELATIVE PROBABILITY OF ITS OCCURRENCE IN EITHER JAW.

At this very moment let me say a few words regarding the meaning of the term necrosis. Necrosis may be defined as dead bone. It is a condition, and not a disease. It is a symptom representing a local condition which may be brought about by various causes, such as traumatism, eruptive fevers, syphilis, periosteitis, periodontitis, mercurial poisoning, phosphorous poisoning, arsenical poisoning, tuberculosis, osteomyelitis, etc. It will be realized that we must recognize the fundamental principles of the etiological factors that are productive of necrosis. While we recognize necrosis as a condition, it is well to know that it is more common in the lower than in the upper jaw because the upper jaw has a greater vascularity, the free anastomosis of its vessels augmenting its recuperative power. The maxilla is better protected and less liable to injury than the mandible. Then, again, we must remember that the maxilla has numerous branches of the internal maxillary arteries, which freely inosculate with one another, and with those of the opposite side. The lower jaw has only one branch on each side, and these do not fully anastomose with one another. The lower jaw stands fifth among the bones of the skeleton in its liability to necrosis; the upper jaw occupies twelfth place. The lower jaw is two and one-half times more liable to necrosis than the upper.

DIFFERENTIAL DIAGNOSIS BETWEEN SUBPERIOSTEAL ABSCESS AND EMPYEMA OF THE MAXILLARY ANTRUM.

Let us now consider some of the etiological factors. We have already spoken of subperiosteal abscess, and I wish to elaborate on it a little more, and especially in its relation to the antrum. I have during the last two years had the good fortune of seeing many cases that were diagnosed as being empyema of the antrum because the X-ray or transillumination test showed a dark area, and it was natural that one would be led into the belief that the cavity was filled with pus, and rightly so; yet clinical experiences have frequently proved the opposite. We must remember that the floor of the antrum has a muco-periosteal covering. Anatomically we know that the roots of certain teeth frequently come close to, and sometimes penetrate, the floor of the maxillary sinus. It is but natural, then, to recognize the fact that any infection of the dental pulp or the peridental membrane will destroy the bony floor of the antrum and push the periosteum upward. In other words, it strips it from the bone, and the pus, continuing to form, will have a tendency to enlarge it, so that it will resemble a balloon in a bone cavity. In this connection I wish to emphasize the importance of applying conservative surgical procedure. Any attempt to puncture this balloon in the antrum will have a tendency to produce an infection of the antrum proper, therefore we must be careful in making a differential diagnosis between subperiosteal abscess of the antrum and empyema of the antrum. This can best be accomplished by exploratory procedures. By that I mean that, if one is in doubt as to whether the case is one of subperiosteal abscess of the antrum or of empyema, the inner wall is punctured in the region of the inferior meatus, and sterile water is injected. Should pus flow from the antrum, we have a positive proof that the case is one of inflammation of the antrum proper. Should no pus flow, then I proceed to make an exploratory puncture in the alveolar cul-de-sac, which usually establishes proof whether or not we are dealing with a subperiosteal abscess of the antrum. In order to establish this more clearly, I want to call attention to a case which was referred to me by a well-known rhinologist of our city:

The patient had a large swelling on the right side of the upper jaw. An X-ray examination of the antrum showed that it was almost closed with pus. The upper first molar had been extracted by a dentist, and shortly after the extraction, the patient began to suffer considerable pain in the region of the jaw. The rhinologist had made an exploratory puncture through the nose, but failed to obtain any pus; he therefore was satisfied that the case was not empyema of the antrum. I carefully examined the case by probing through the socket of the mesial buccal root of the upper first molar, and passed a silver probe into a large cavity. There was considerable bone destruction on the antrum floor, and I was satisfied that we were dealing with a typical subperiosteal abscess of the antrum. The patient was operated on at the hospital, and by careful dissection and curetment I succeeded in removing a large part of the floor of the antrum without penetrating the muco-periosteal covering. The pus was thoroughly evacuated, and the cavity permitted to heal by granulation.

It will be noted that any radical procedure in this case, such as puncturing the covering of the infected area, would have caused further infection of the antrum proper, and made the case a complicated one.

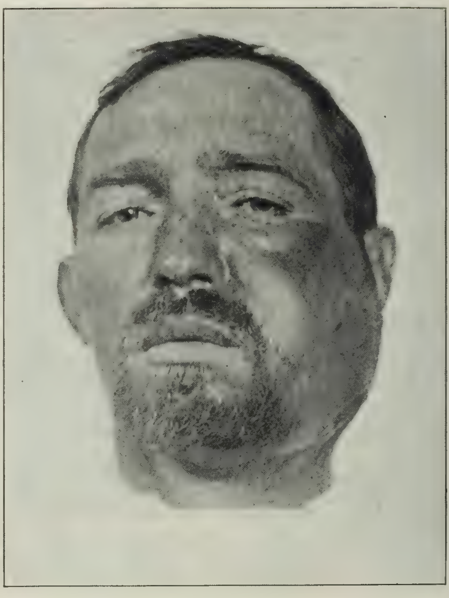
OSTEOMYELITIS.

Osteomyelitis is another factor that produces considerable bone destruction. Osteomyelitis may be defined as an inflammation of the marrow of a bone; it affects chiefly the interior structure. The acute condition is usually septic and marked by chills, fever, suppuration of the medullary cavity, and the formation of pyemic abscesses, while chronic osteomyelitis develops from syphilis or tuberculosis, or occurs after an injury. Osteomyelitis is frequently complicated by periosteitis, so that we have a condition known as osteo-periosteitis, which frequently produces infections of the dental pulp and peridental membrane. No dentist can hope to obtain a satisfactory cure in trying to treat the primary condition only. Is it not but reasonable to assert that it is a waste of time and energy for the dentist to be treating a root-canal or a peridental membrane the disease of which was produced from a primary condition known as subperiosteal abscess, or periosteitis, or osteomyelitis, or complications of these?

I only recently had a very difficult case to take care of, and it will probably prove interesting, viz:

A man, forty years of age and teamster by occupation, noticed that during the cold winter days in January 1912 it was rather difficult for him to open his mouth. (See Fig. 1.) He consulted a physician, who tried to cure the condition without knowing the cause. He applied electrical treatments, until he severely burned both cheeks of the man, yet there was no improvement. The patient then consulted another physician, who referred him to a dentist, and the dentist referred him to me. It was a rather difficult case to diagnose. He was suffering from trismus dentium, with a slight swelling in the region of the temporo-mandibular articulation. On account of the inability to open his mouth, it was impossible to make an inspection of the oral cavity. I then decided to observe the case for a few days in order to come to a conclusion. The third day he complained of more pain in his jaw, and his temperature was 101°. I then was satisfied that he must have pus somewhere in the jaw. I referred him to the hospital to be anesthetized, and proceeded to open the mouth with a screw gag. After the mouth was widely dilated, I could thoroughly inspect, palpate, and percuss the jaws and teeth. I found the upper left third molar loose in its socket, and there was a slight fluctuation in the alveolar cul-de-sac above the root. The tooth was extracted, and a silver probe passed into the socket, which showed a fistula leading backward into the tonsil. There was considerable necrosed bone in the upper jaw, and considerable pus. The area infected was surgically treated and iodoform gauze packed into the cavity. Shortly after the anesthetic, the patient developed chills, and within a day he developed

Fig. 1.



Peritonsillar abscess and osteo-periosteitis of ramus from an infected third molar.

a fever of 104°; his breath was foul, his face was flushed, and had a worried look. Hot packs were applied to his face and jaws all night, and cathartics given; yet there seemed to be little improvement.

The next day I made another inspection of his mouth, and found that he was suffering from a peritonsillar abscess, which had swollen to the extent that the soft palate was so enlarged that it was difficult for him to breathe, and impossible for him to swallow any liquid food. The patient was extremely weak. I was satisfied that the operative procedures applied two days before had not checked the infection. I therefore made a large incision in the center of an imaginary line drawn from the last molar to the tip of the uvula, and succeeded in obtaining a large quantity of pus. After that the mouth was irrigated every hour, and hot compresses applied to the face, neck, and jaws. This gave the patient considerable relief, and he was able to breathe better and take some liquid food. The next day I noticed that while the patient's temperature dropped to 101°, he was far from getting better. As I was satisfied that the pus had burrowed under the periosteum of the ascending ramus, setting up a severe subperiosteal abscess, I made an incision on the outside of the angle of the jaw and succeeded in getting the pus to drain externally.

He was given the best attention for about two weeks, but notwithstanding this treatment he did not make the progress that I hoped for. His face still remained considerably enlarged, and the discharge of pus quite severe. I then decided that it was necessary to perform another operation. He was anesthetized with ether, and a two-inch incision was made along the angle of the jaw, the tissue retracted, and when I began to examine the bone, I found that the periosteum was considerably stripped on the inner and outer side of the jaw-bone, causing considerable necrosis. Separation had taken place between the vital and the necrosed bone. The sequestrum was removed; it measured one inch in length and three-fourths of an inch in width. I opened up all the pockets in the tissues, curetted all the degenerated mass, thoroughly irrigated the wound, and packed with iodoform gauze. The patient made a rapid recovery.

You will note that this case started from an infected upper third molar, traveled backward, set up a peritonsillar abscess, then a subperiosteal abscess of the ascending ramus, then an osteitis, then necrosis, and finally a sequestrum.

Injury to the jaw-bone, such as blows, gunshot wounds, or jaw fractures, often produces infection of its interior structure. This condition, if untreated, is liable to produce much bone destruction, and occasionally the patient loses the entire bone. The treatment, of course, is always surgical, consisting in obtaining good drainage and removing all of the degenerated bone.

DENTAL ORIGIN OF SERIOUS INFLAMMATORY CONDITIONS. A CASE OF TRISMUS OF THE JAWS.

It is well to know that many of these inflammatory conditions frequently arise from one, or a combination of dental lesions. The dental lesion to which I refer is of common occurrence, such as caries, the late eruption of teeth, periodontitis, pulpitis, etc. The history of another case will illustrate this:

The patient was a young lady, nineteen years of age, suffering from a bad case of trismus of the jaws. Upon examination, I found a severe inflammation of the mouth, throat and face. The jaws were set firmly, the face flushed, the breath foul, and the temperature 104°. I found it impossible to make an oral examination or to palpate the teeth, on account of the patient's inability to open the mouth. This case of trismus, then, was secondary to some primary lesion; and the problem, in order to relieve the pain, was to find the cause. Careful inquiry as to the history of the case, examination by probing, which showed that all teeth had erupted, and had been extracted, and the age of the patient furnished sufficient proof that the primary lesion might be in a lower right third molar, which probably had not erupted. Upon careful probing, I found that the mesial buccal cusp of the lower third molar was separating from the gum tissues, while the remaining portion of the tooth was covered with integuments of the ramus, and was the seat of a most aggravating periodontitis. The patient was placed under ether anesthesia, the mouth opened, and, after considerable difficulty and dissection, the tooth was removed. The wound was packed with iodoform gauze, which was removed the next day, and the patient was discharged as cured.

IMPACTED THIRD MOLARS, AND CONSEQUENCES.

The third molar may erupt any time after the seventeenth year. On account of its peculiar anatomy and location, it may erupt only partially, and sometimes not at all. The fact that the third molar undergoes decay is largely due to the operculum of the gum, which covers the greater part of the occlusal surface of the tooth, allowing the decomposition of the epithelial scales and other débris of the mouth, combined with the acidity due to disintegration, to corrode the structure of the tooth, which quickly destroys its integrity. This process of degeneration, if unchecked, will soon produce pulpitis, causing violent odontalgia, and in time will produce death of the pulp and a suppuration which may, at a later time, pass through the apical foramen and produce a most aggravating periodontitis, causing the tooth to become loose in the socket, producing a pronounced swelling. The patient suffers excruciating pain, with pus oozing from the gingival margin of the tooth into the mouth, thus causing an osteo-gingivitis. Frequently, however, the infection may travel from the apical foramen and produce a very extensive condition of osteomyelitis. The pus burrowing down deep into the bone sometimes produces a fistula within or outside of the mouth, which, if untreated, becomes chronic. I have seen some of the most alarming infections produced in this way. There is no tooth in the mouth that is so frequently delayed in its eruption as the third molar. The cause of this condition is best described in the words of the late Dr. James E. Garretson:

> The advent of the wisdom teeth is very often accompanied by painful and distressing symptoms, that may be protracted through many months, or it may be even years, unless relieved by surgical interference. These circumstances arise from the position occupied by these organs, so close to the joint of the lower jaw, where the mucous membrane is reflected from the gum to the cheeks and fauces, combined with the very common condition that the jaw is not sufficiently elongated backward to allow them to range in the horizontal series with the other teeth. This mechanical difficulty not only prevents the proper evolution of the teeth, holding them back in their bony bed, but it often perverts their direction of growth and dislocates them. Annoying and very painful as are often the symptoms attendant on difficult eruption and misplacement of the upper wisdom teeth, they are trivial in comparison with those which occur in similar conditions of the lower.

As I have said, there is no tooth in the mouth that is so frequently delayed in its eruption as the third molar; however, in connection with the rapid advancement made along orthodontic lines, and the solicitude to obtain normal occlusion for patients having malocclusion, specialists have been urged on to do more research work by means of dissections and radiography, and convincing proof has been thereby obtained that unerupted teeth are not uncommon.

MALOCCLUSION.

The failure of these teeth to erupt has brought forth as many theories on this failure as there are different kinds of impacted teeth. I am assured by my personal experience, as well as by the experience of other orthodontists, that impacted teeth or so-called delayed eruption is an easy matter to correct by giving aid through the proper methods of orthodontic treatment. In nature's ideal mouth perfect occlusion is established, so that each tooth antagonizes with its opponent normally. It is the purpose of orthodontists to assist nature, and at an early period in the child's development, at a time when there is growth, to guide the teeth to erupt normally and prevent the individual from falling into the dangers of progressive malocclusion. No one can deny that malocclusion, when once established, becomes worse day by day, producing a mouth deformity of a greater or lesser degree. The force governing malocclusion is the condition in which a tooth occupies the position which rightfully belongs to another tooth, hence it will retard not only alveolar development but deflect other teeth from the path of eruption, and sometimes temporarily, many times permanently, prevent teeth from erupting.

FOLLICULAR ODONTOMES (DENTIGEROUS CYSTS) AND COMPLICATIONS.

Misplaced teeth, embedded in the jawbone for a long period, may at any time undergo pathological transformation. Follicular odontomes, frequently called dentigerous cysts, are produced by the development of a cavity around some misplaced tooth. This form of tumor is at first firm and hard, but later on, on account of the pronounced expansion of the jaw and the thinning of the incasing wall, will upon palpation fluctuate and give a crackling sound. This kind of tumor may at any time undergo a very extensive suppurative inflammation, brought on frequently by infection which has traveled from the infected pulp of a neighboring tooth or through the blood and lymphatic channels. The patient will complain of a throbbing and continuous pain, the surrounding area becoming swollen. Usually, the temperature will range from 102° up, and leucocytosis be present. This local inflammatory condition will prevent the patient from opening the mouth.

PRACTICAL CASES.

On one occasion I was consulted in regard to a young lady, whose case follows:

The patient, eighteen years of age, complained of a severe pain in the lower jaw in the region of the right first and second molars. Upon examination I found that she was unable to open her mouth, that there was a pronounced swelling which was quite firm, hard, and painful; she had a temperature of 103°, her breath was foul, and she showed an anxious expression. Upon inquiry into the history of the patient, I was informed that several weeks previous her family dentist had been treating the putrescent canals of the lower right second molar, but that she had failed to fulfil her engagements for further treatments. One week previous to the time when the dentist was consulted, she had pain in the region of the lower right second molar that had gradually become worse, notwithstanding the careful cleansing and opening of the root-canals of the molar by her dentist; her condition grew rapidly worse, and when I saw her she was suffering excruciating pain, being unable to obtain any rest after being given hypodermic injections of morphin. Operation was advised; she was taken to the hospital the next morning and anesthetized with ether, after which the mouth was carefully and gradually opened. I then discovered that the teeth in the lower jaw had normally erupted but that there were no signs of the third molars erupting. Upon examination of the tumor below the mandible, I found that there was some fluctuation upon palpation. It seemed to me that I would obtain a crackling sound upon pressure. I then came to the conclusion that the patient had an impacted third molar which was encysted, and had become infected from the putrescent canals of the second molar. Incision was made below the mandible, and by gouging away some of the thin bone that covered the tumor I found the third molar with considerable pus. The entire cavity was carefully curetted and packed with five per cent. iodoform gauze, which was later removed to allow the wound to heal by granulation. The patient had an uninterrupted recovery and was discharged cured in two weeks.

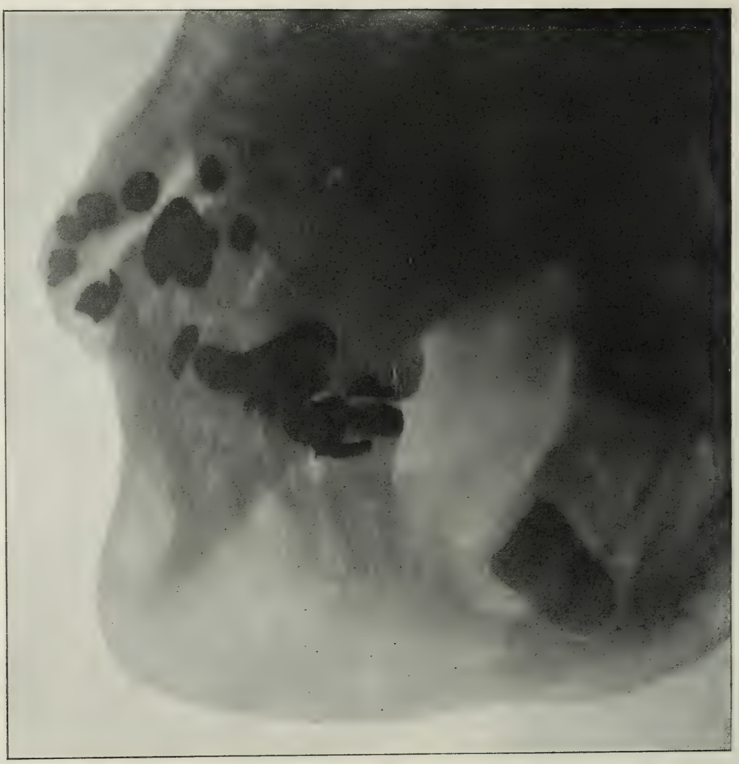
I desire to relate another interesting case:

Miss B., a nurse, exhibited pus in the throat, with a swollen left tonsil. She said that the left second and third molars had been extracted in order to give her relief from pain in that region. Examination by probing showed a fistula leading from the region of the extracted second molar downward and backward. The probe seemed to glide past a hard substance and travel inward toward the tonsil. She was firm in her belief that the third molar had been extracted, yet I would not exclude from my diagnosis an unerupted third molar, unless the X ray proved her statement. Much to her surprise we found that she must have been mistaken, or that the tooth embedded in her jaw was a fourth molar—which, however, made little difference; the object in question was relief. Fig. 2 shows the X-ray photograph, with notable destruction of bone leading down to the embedded molar.

The patient was anesthetized with nitrous oxid and oxygen, and ether. The internal muco-periosteal cover was stripped from the bone, and a part of the internal plate removed, the tooth lifted out, and the necrosed bone thoroughly removed. The flap was laid into the wound, leaving one-third bare; the wound was packed with gauze, which was allowed to remain twenty-four hours and then removed, and the wound was frequently irrigated with hot saline solution.

As a result, there was no further discharge of pus, and the wound healed rapidly. The tonsil became normal and the patient's health was much improved.

FIG. 2.



Impacted molar producing infection of tonsils.

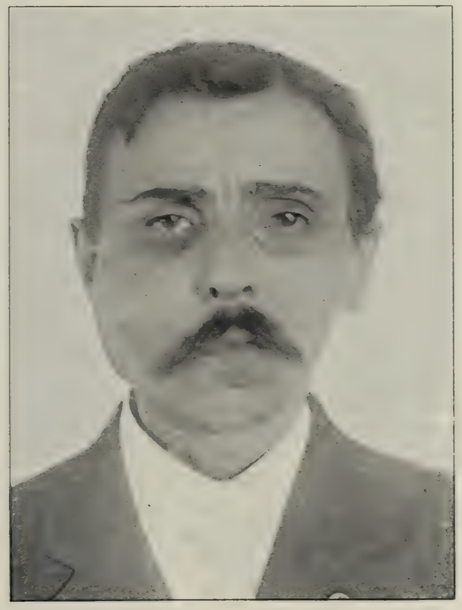
ORAL DISEASE OF SYPHILITIC ORIGIN.

I hope I can indelibly impress upon the dentist's mind the importance of being familiar with the pathology of syphilis. I have many times had the opportunity to see cases in which dentists administered local treatment by means of tooth-cleaning technique in patients who had a suppurative alveolar periodontitis, the patient being told by the dentist that he or she had pyorrhea because the teeth were loose and there was pus oozing from the gingival margin. Yet in many of these cases I have found that the patient was suffering from syphilis, and as a rule the patient would admit that he or she had some time in the past become infected, and been under specific treatment. In others, serum diagnosis would tell the story.

Several months ago, Mr. W., forty-two years of age, machinist by occupation, was referred to my clinic complaining of trismus dentium, with a large tumor on the right side of the face. He gave the following history:

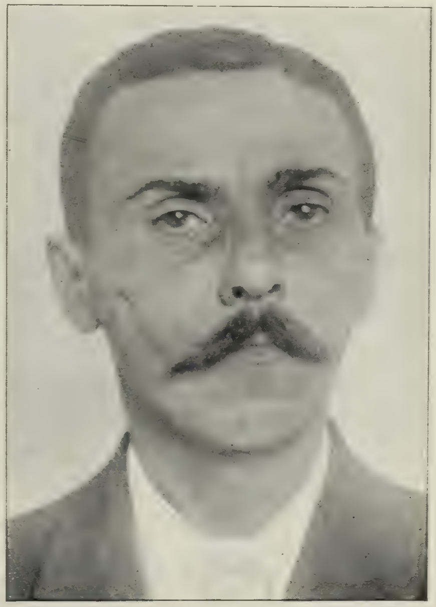
His health was fair, but he had always been suffering from loose teeth. In January 1911, he called on his dentist to have a loose upper first molar extracted. A few days after the operation, he noticed a swelling in the region of the extracted tooth. He called on his dentist, who referred him to a physician. Operation was advised, which was refused. The swelling increased rapidly, and in a short time it was of such size that it prevented jaw movement. He now felt very weak, and had lost considerably in weight. Examination showed a tumor quite firm and immovable and painless upon pressure, except over the region of the maxillary sinus. Upon examination of the oral cavity, I found all of the upper teeth lost, except the upper right first and second bicuspids, these teeth being very loose, with pus flowing from the gingival margin. A silver probe passed into the pus pocket of the loose teeth would travel upward into the external surface of the maxilla. By probing, I could ascertain that there was considerable bone destruction. Upon inquiry into the history of this case, the patient admitted to me that he had had a chancre twenty years ago, but he denied ever having had secondary symptoms. A serum diagnosis was made, which showed a positive Wasserman reaction. The patient was then placed under anti-syphilitic treatment, and within two weeks we succeeded in inducing the tumor to break down. The patient was operated upon shortly after. The right maxillary bone was found to be considerably necrosed. We therefore removed the entire degenerated mass and packed with gauze, which was later removed to allow the wound to heal by granulation. The patient made splendid progress, and ten days later was given an injection of salvarsan. He has made an uninterrupted recovery. (See Figs. 3 and 4.)

FIG. 3.



Syphilitic osteomyelitis of right maxilla.

FIG. 4.



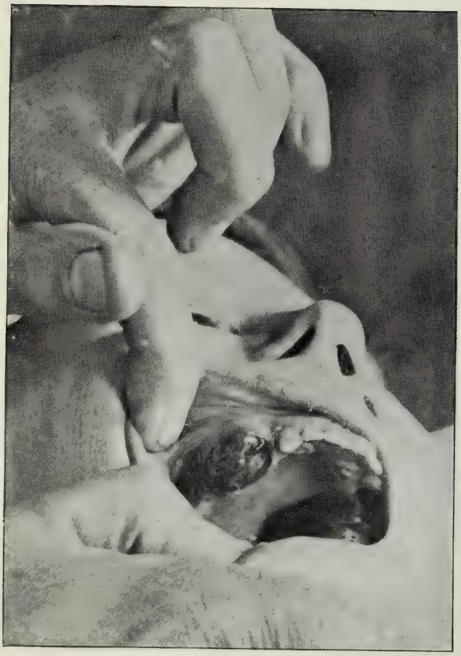
Results after anti-syphilitic treatment and surgical interference.

This patient for almost twenty years had frequently consulted a dentist in regard to his loose teeth, yet at no time was an attempt made to diagnose his case, except that he was told he had pyorrhea, just because his teeth were loose!

Attention is called to another case, as follows:

Mrs. S., twenty-seven years of age, noticed a swelling over the right second bicuspid. She consulted her dentist, who informed her that she had a blind abscess. He painted the external surface with iodin, and later applied what the patient called a gum blister. She, however, noticed no improvement, so the dentist extracted the tooth. The swelling remained at a standstill, and so one by one she had the molars and the remaining bicuspid extracted. This gave her no relief, and the condition became worse, evidently owing to the infection entering through the wound caused by the extraction. The dentist diagnosed her case as a chronic blind abscess with necrosis. She finally consulted a physician, who referred her to my clinic. We immediately investigated her history. She said she was married, had no children, and had aborted three times. Physical examination showed that the patient had old scars, and she admitted having had syphilis. She was promptly placed under anti-syphilitic treatment, and the jaw was thoroughly curetted. A diagnosis of syphilitic osteomyelitis with granulomata of the jaw was made. Three weeks later the patient showed splendid improvement, and was referred to her family physician for further attention. (See Fig. 5.)

Fig. 5.



Syphilitic osteomyelitis of maxilla.

TWO TYPICAL CASES FOR DIFFERENTIAL DIAGNOSIS.

Before concluding, I want to call attention to two cases, picturing how different each case is from the standpoint of etiology, and yet how they simulate one another as to the clinical picture:

Mr. L., twenty-seven years of age. Occupation: Locomotive fireman. Complaint: Sore loose teeth. Habits: Fair. Urinary analysis: Negative. Headache: Considerable. Loss of hair: Yes. Specific history: Doubtful. Blood pressure: Normal. Serum diagnosis: Positive Wasserman. Lower and upper teeth loose, with the gums swollen and angry looking; gums not painful to touch; some discharge of pus from sockets; gums bleed easily; breath foul. Posterior teeth firm. Diagnosis: Syphilis producing suppurative alveolar periodontitis. Prognosis: Favorable. Treatment: Salvarsan, intravenously, and curetment of teeth, with usual prophylactic treatment. Result: Cured.

Mr. J., sixty-five years of age. Occupation: Cobbler. Complaint: Sore loose teeth. Habits: Heavy drinker. Urinary analysis: Albumin and sugar. Headache: Considerable. Loss of hair: None. Specific history: None. Blood pressure: High. Serum diagnosis: Negative Wasserman. Teeth loose in both arches, anterior teeth very loose, with considerable pus discharging from sockets. Gums gangrenous and bleeding easily, breath foul, and unhealthy looking palate, reddened and swollen. Diagnosis: Arterial sclerosis with interstitial nephritis and diabetic gangrene of the mouth. Prognosis: Unfavorable. Treatment: Palliative. Result: Patient died of diabetic coma.

THE DENTIST'S GRAVE RESPONSIBILITY IN REGARD TO CORRECT DIAGNOSIS.

These two interesting cases should demonstrate the importance of having a thorough understanding of the etiology, diagnosis, prognosis, and treatment of diseases and deformities of the oral cavity. Strange as it may seem, these two patients were more or less under the care of dentists, yet at no time was an attempt made to find the real cause of the suppurative inflammatory condition of their jaws. In the young man, syphilis was a factor in causing his trouble in the mouth. In the old man, a complication of diabetic nephritis and arterial sclerosis produced the suppurative condition. No one could expect to cure these cases with scalers, brush, and pumice-stone. Yet, strange as it may seem, the young man had consulted a number of dentists, and each time was informed that he had pyorrhea. One specialist of the so-called pyorrhea enthusiasts' class, who could not see farther than pumice-stone on the end of a stick, and whose knowledge of pathology would not cover a postage stamp, was seemingly trying to impress this patient that, if he would spend several hundred dollars, he could effect a cure with his one hundred and eight instruments and his wonderful technique of removing tartar. Such a man almost reminds me of the young medical graduate who, through procrastination and having a rich father to rely on, was not making much of a success as a medical practitioner; so he decided that a trip to Europe would fit him as a specialist. When he arrived at the Allgemeines Kranken-Haus, and was told that in order to be a specialist he had to knuckle down to hard, strenuous work, he was satisfied to let the other fellow use the microscope, while he enjoyed a student's visit to the beer-table. After six weeks' sightseeing in Vienna, Berlin, and London, he returned to his home town, and introduced himself to the profession as a specialist with the following words:

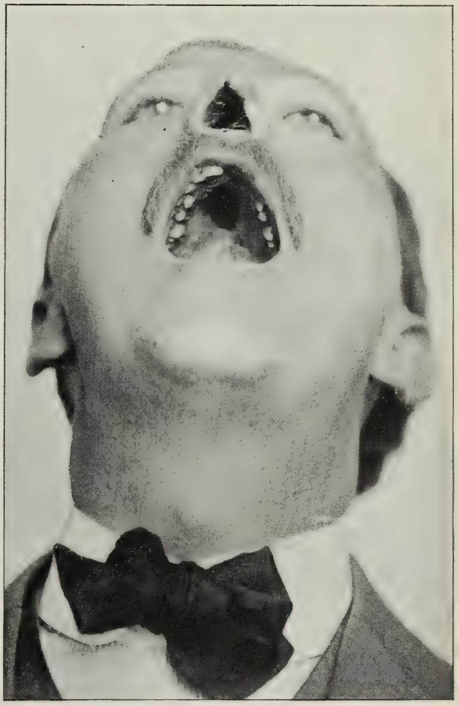
I have just returned from o'er the sea—
Send your cases straight to me;
I am a specialist—yes, by Gee!
And I belong to the State Society.

A PITIFUL CASE OF WRONG DIAGNOSIS.

Time does not permit of giving a full report of the many cases I have recorded wherein syphilitic patients with suppuration of the oral cavity had been, for a long time, under the care of a dentist. The dentist invariably, either through ignorance or carelessness, would not recognize the etiological factor of the patient's oral disturbance. I will never forget a case which indeed is a sad one:

In March 1911, a young man called at my office, having been referred by a physician. He complained that his upper anterior teeth were sore and loose, with pus discharging from the nose. He was twenty-five years of age, head bookkeeper for a large mercantile business. This man had the appearance of coming from a good family; he was intelligent, refined, courteous, and handsome. He gave a history of having consulted a number of dentists, being informed each time that he was suffering from pyorrhea. He had had the roots scraped and the gums painted with iodin. Upon inquiry into the history of the case he admitted that he had had a chancre about three years ago, and that he had taken treatment for syphilis for about three months.

Fig. 6.



Syphilitic destruction of nose and palate.

Examination showed the septum perforated, the vomer and a part of the hard palate necrosed; the left central and lateral incisors very loose, with a considerable portion of the alveolar process destroyed. When I informed him that syphilis was the cause, he was much disturbed; but when I told him that he was going to lose a large part of his palate and septum and two teeth, he wept bitterly, and between sobs he begged pitifully for help. He offered everything he had, if I would cure him without the loss of so much tissue. (See Fig. 6.)

All this time I could not help thinking of the faulty diagnosis, viz, that the patient had pyorrhea! What a blot on the good name of dentistry! What a pity that not one man of all the dentists he had consulted attempted to get at the bottom of his trouble, and save him from being a cripple all his life. This man now walks the streets with the stigma of syphilis facing his friends. Fortunately, the opening was closed with an artificial palate constructed in gold, to which porcelain teeth were attached to take the place of the ones that were lost. This permits him to speak distinctly.

PYORRHEA DELUSIONS.

I do not wish to convey the idea that I am opposed to prophylactic treatment. I am a firm believer in the old adage that cleanliness comes next to godliness. But in this day of enthusiasm about mouth prophylaxis, many members of the dental profession are losing sight of the principles underlying the production of disease. The subject of so-called pyorrhea seems to have inspired the dental profession to such a height of enthusiasm that our societies spend hours in its discussion, and journals devote pages to its treatment. Are we to believe that the mouth harbors one disease? Are we to believe that loose teeth are always caused by "pyorrhea"? Are we to believe that mouth diseases are always primary? Are we to forget that many diseases of the mouth are secondary to some other condition of the human anatomy? If such is the consensus of opinion, then we have not as yet passed beyond a speculative profession. Not a day passes but one hears of some layman who is led to believe that he has pyorrhea. Fake dental parlors are advertising its cure. Men high in the profession sing its song, and proudly boast of the fees they get. Thus we are in the height of frenzied pyorrhea delusion.

TREATMENT BY THE ORTHODONTIST SUPPLEMENTING THAT BY THE RHINOLOGIST.

By **A. H. KETCHAM**, D.D.S., Denver, Colorado.

(Read before the American Laryngological, Rhinological, and Otological Society, at Philadelphia, Pa., May 14, 1912.)

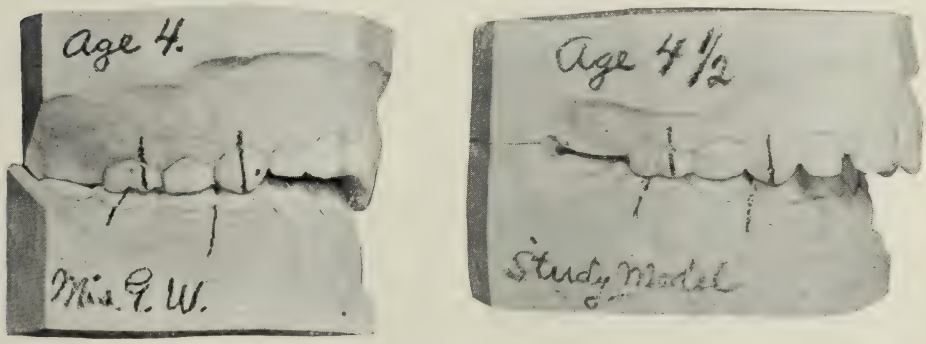
DR. NOYES has shown at this meeting how the dental arches, the bones of the face, and the nasal cavity develop normally in response to perfectly balanced forces. He has also shown how they develop abnormally in response to interference with normal forces. It is my purpose to show how the orthodontist may overcome abnormal forces: How he may interrupt the progress of the abnormal formation of the bones and tissues of the jaws, the face, and the nasal cavity, as well as the accessory sinuses. How normal forces may then be made to act so that abnormal development may give way to normal development, and the poorly developed mouth-breather, who usually is backward mentally as well as physically, may be induced to develop along physiological lines.

ORTHODONTIA PATIENTS MOSTLY MOUTH-BREATHERS.

I understand that many of your patients are mouth-breathers, breathing through the mouth at least part of the time; that the principal cause of mouth-breathing is the presence of adenoid vegetations; that you often have, associated with these, enlargement of the tonsils, and also a deflected septum. The other causes of nasal stenosis—such as a deflected septum due to trauma, hypertrophy, ledges and spurs, and also hypertrophy of the turbinates—do not occur so frequently. I find by experience that many of your patients over seven or eight years of age upon whom you have operated for adenoids have not been cured of mouth-breathing. Dr. Noyes has shown the reason for this; for if an abnormal force, such as breathing through the mouth, has been operating for considerable length of time, lack of development of the involved bones and muscles, malocclusion of the teeth, with hypertrophy of the lining membrane of the nose due to altered atmospheric pressure, must result.

In order to make certain that my experience was not exceptional, I sent a list of questions to eighty-five orthodontists of full experience, most of whom replied, and their answers show that the majority of the orthodontist's patients are mouth-breathers when first examined, though most have undergone an operation for removal of adenoids. The minority, though afflicted with malocclusion of the teeth and more or less constricted dental arches, have sufficient breathing-space and have never suffered from enlarged adenoids, or other form of nasal obstruction. I do not know what percentage of your adenoid cases have broad dental arches with well-developed nasal spaces, but I take it for granted that it is quite small; for, in these cases, the presence of adenoids—unless in large masses—would not interfere with the patient's breathing. The evidence which is forced upon the orthodontist every day is that while the adenoid operation is quite necessary, it alone is not often a cure for mouth-breathing, except in the younger patients where the cause has been operative for but a short time and has not caused malformation of the bones or abnormal development of the muscles involved—although at the early age of four and four and one-half years great malformation may result, as is shown by Fig. 1.

Fig. 1.

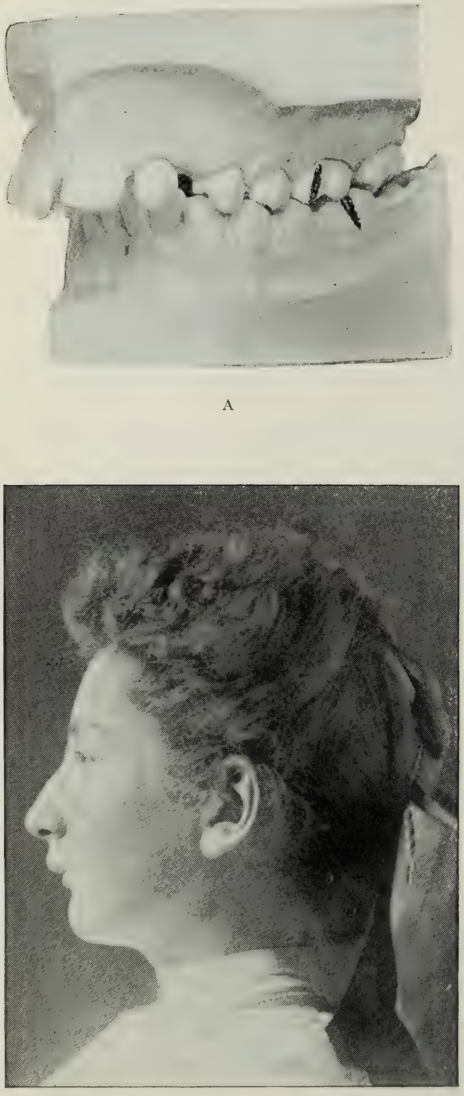


MOUTH-BREATHING PERSISTING AFTER REMOVAL OF ADENOIDS.

You may ask, When the rhinologist has failed to establish normal breathing, how can the orthodontist relieve this condition?

In the first place, I will take for illustration an aggravated case (Fig. 2, A and B) from that type in which there is ample breathing-space after adenoids have been removed and yet the child continues to breathe through the mouth. It is impossible to close the lips on account of the protrusion of the upper anterior teeth. You can readily see that by reducing these abnormal relations the orthodontist can make it possible for the patient to close the lips and breathe through the nose. (Fig. 3, C and D.) This also establishes a normal distribution of the forces of occlusion in the mastication of food, of tongue pressure inside the dental arches, and of lip and cheek pressure outside, and the establishment of normal air-pressure in the nasal cavity. By use, the weak upper lip is developed. By eliminating abnormal exercise—in making it impossible for the lower lip to be drawn in behind the upper incisors—its thickness is reduced. The muscles which hold the mandible forward are strengthened, and the mouth is kept closed by the wearing of intermaxillary elastics from the region of the upper canine to the lower first molar. These ligatures are usually worn day and night during the active period of treatment, and

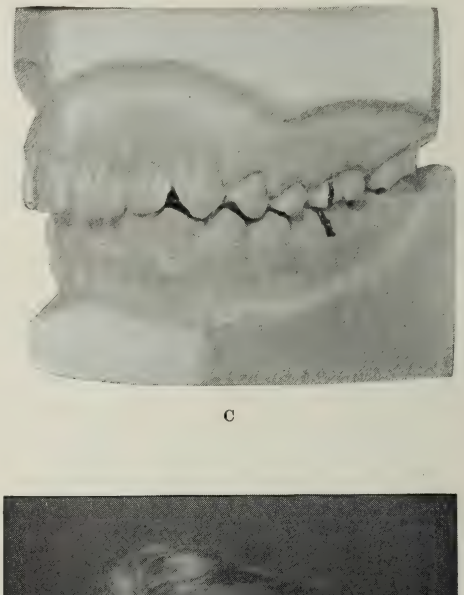
Fig. 2.



A

B

Fig. 3.

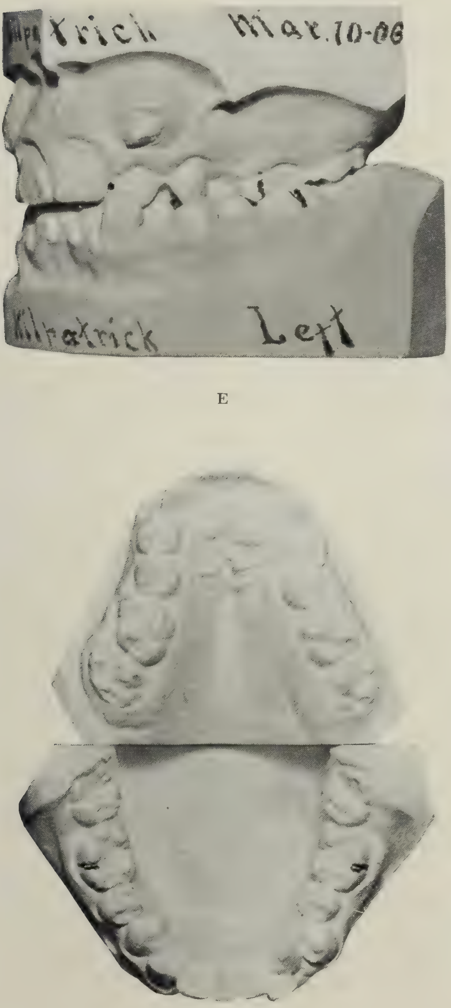


C

D

at night during the period of retention, which should last until mouth-breathing has been overcome.

FIG. 4.



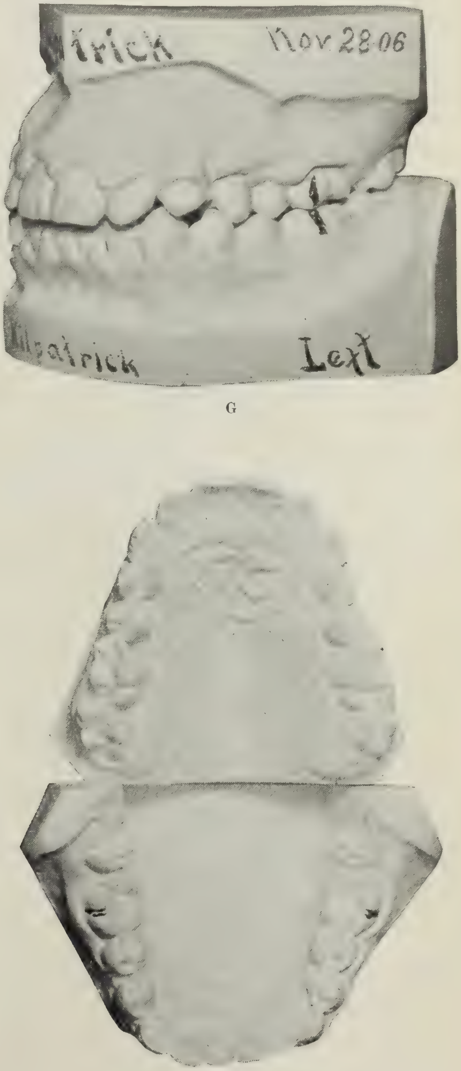
E

F

THE ORTHODONTIST'S RELATION TO ANOTHER CLASS OF SUCH CASES.

Now comes the question of those cases in which the nasal space is lacking in development; in which the dental arch and maxillary bones are narrow; in which the removal of adenoids has been of no appreciable benefit to the breathing. What can the orthodontist do to help these cases? In the younger patients he can establish a balance of the forces of occlusion and thus stimulate growth and overcome the arrested development by applying gentle pressure to the teeth, gradually widening the dental arches and placing the upper and lower teeth in their normal relations, so that the force in masticating food is transmitted through the teeth to

FIG. 5.

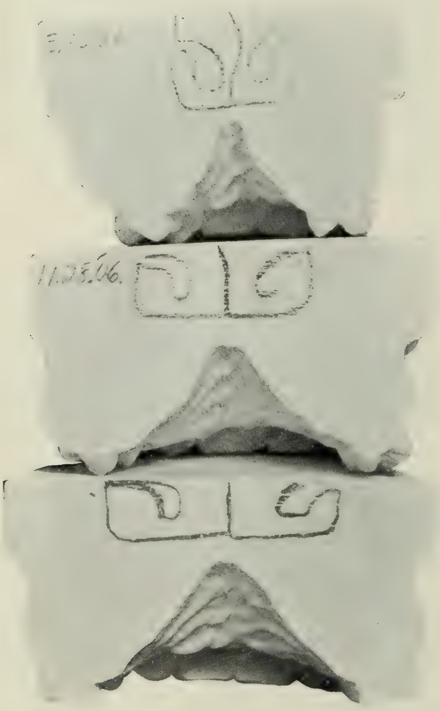


G

H

the maxillary bones and their palatine processes which form the floor of the nose. These forces, being now correctly distributed, will continue the development and widening of the nasal cavity. When the septum is deflected it will usually be benefited. Of course we cannot hope by this means to overcome deflection due to trauma, hypertrophy, ledges and spurs. You may think that I am over-sanguine, but the evidence furnished by orthodontists is overwhelmingly in the affirmative. A large number of cases have been cited where children with constricted nasal spaces have developed efficient breathing-spaces as a result of stimulation due to the work of the orthodontist. The majority of the patients had improved in general health and gained in weight to a greater extent than ever before during a similar period, and had gained more than the average child at a corresponding age; gains of from fifteen to twenty-five pounds during the first year's treatment are not at all infrequent. In many of these cases adenoids had been removed several years prior to the beginning of orthodontic treatment, the patient remaining a mouth-breather without experiencing any particular improvement in general health or the normal gain in growth and development.

Fig. 6.



AN ILLUSTRATIVE CASE.

This type of cases is well illustrated in Fig. 4, E and F. The history of the case is as follows: Enlarged tonsils removed at six years of age, adenoids one year later, but the operations were too late to materially help the nasal space or the dental arches, for growth had been so much arrested that while removal of tonsils and adenoids prevented the case from becoming even worse, yet you see what a badly constricted arch and what maloccluded teeth the patient had at fourteen years of age, when he presented for orthodontic treatment. The boy's rhinologist, Dr. T. E. Carmody of Denver, reported that on examination he found the nasal space about one-half normal, not only on account of narrowing, but on account of an intumescent condition of the tissues; septum deflected to the right. It was examined at intervals of several weeks, and after packing with adrenalin the intumescence would disappear but show a narrow nasal space, which became greater as treatment progressed. (Fig. 6.) The condition on the oral side of the palatine portion of the maxillary bones was fully as bad. The distance across the roof of the mouth between the upper second premolars at the gum line was but 18 mm.

Extraction of two or more premolars and the drawing back and down of the upper canines would have been our only recourse a few years previous to the time this case was treated. Unfortunately such procedure is sometimes followed today, but it leaves the maxillary arch just as narrow as before treatment, and thus can have no beneficial effect upon the nasal cavity. It leaves the teeth still in malocclusion with no improvement in function. The patient is left with an undeveloped nasal cavity and a deformed oral cavity, with little chance of reaching normal physical development. Fortunately, Dr. Edward H. Angle a few years ago proved that in these cases, by retaining the full complement of teeth and placing them in their normal positions, development of the alveolar process over the roots of the teeth would take place, and there would be a building-in of bone. This was proved in a number of instances by carefully made models.

Since this development of the alveolar process takes place, it is logical to assume there must be a similar development of the maxillary bones, and consequent increase in size of the nasal cavity. This has been verified in many cases by rhinologist's examinations before and after the orthodontist's treatment.

By a new appliance designed by Dr. Angle we are now able to move the roots of the teeth out as rapidly as we do the crowns, thus transmitting the gentle stimulation directly to the body of the maxillary bones.

To continue the history of this case (Fig. 5, G and H): The dental arches were widened and the crowns of the teeth placed in their correct positions. The active tooth movement was completed in less than a year's time. The boy, who was poorly nourished and stunted when treatment was begun, did not suffer, but gained in weight and health during the operation. At the end of this period he again visited his rhinologist, who reported that the nasal space was about two-thirds to three-fourths normal, due to apparent widening of the nasal space and subsidence of the intumescence—this as a result of widening the maxillary arch. The measurements showed a gain of 13 mm. across the arch. Three and one-half years after active treatment was completed, his rhinologist reported: Nasal space apparently normal; septum straight; turbinates normal. (Fig. 6.)

Some have claimed that by widening the dental arch the roof of the mouth is lowered. Others claim that this is not true. In my opinion, both statements are partly correct and partly incorrect. It is plain, by dropping a perpendicular line from the roof of the mouth to the plane of the occlusal surfaces of the teeth, in Fig. 6, that the roof is higher in the finished case than in the one before treatment. Could we also measure from the apex of the nasal cavity to its floor, we would find that the distance had increased there also; in other words, there has been a general development of the bones of the face in that they have grown downward and forward as well as broader.

After sixteen years of age, establishing normal balance of all the oral forces helps the nasal cavity, though not to as great an extent as in the younger child, but it is certainly worth while.

THE QUESTION OF OPENING THE MAXILLARY SUTURE.

I have been asked to express an opinion as to what benefit the nasal cavity derives from the attempted opening of the median maxillary suture, as advocated by a number of operators, principal among these being Dr. G. V. I. Brown of Milwaukee, who was one of the first* to advocate this for the purpose of widening the nasal cavity and also allowing the vomer to slip down into the open suture with the expectation that the deflected septum would straighten.

At the outset, I wish to say that all my experience in this operation is of a negative character, in that, while I have tried to separate the median maxillary suture, both in the living subject and in a cadaver, I have failed, or at any rate have not been able to prove that I opened this suture. The latter experiment was on the cadaver of a four- or five-year-old child in which I dissected away the tissues down to the sutures from over the palatal bones forward along the median maxillary suture up to the sutures of the nasal bones, and then carefully constructed an appliance after Dr. Brown's method of experiment on green skulls, which I anchored to the firm temporary canines and to the second temporary molars (the one upon the right side being slightly weakened as the result of an abscess). I applied pressure with the jackscrew and widened the arch 5 mm., at which point the buccal alveolar plate of bone upon the right side gave way. There was no increase in distance across the opening of the nasal cavity, which I measured and marked carefully before pressure was applied to the teeth, nor had the median maxillary suture opened in the least. I cannot say whether or not it would have opened had the alveolar process around the right second temporary molar been as strong as the one on the opposite side.

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* Though this operation was mentioned in the DENTAL COSMOS in 1860. For Dr. G. V. I. Brown, see report in *Journ. Amer. Med. Association,* March 27, 1909.

In the DENTAL COSMOS for January 1909, Dr. Brown, in speaking of opening the median maxillary suture, says:

> By the aid of pressure which is so gently applied that there is no pain and but little inconvenience for the patient, it is possible in all young persons to force the maxillaries apart by separating the median suture extending between the central incisor teeth and on through the central portion of the hard palate. This method is also practicable in older persons, as is shown in our illustrations. Evidence of this is given by the fact that the central incisors are moved apart without an attachment or a direct pressure of any kind being applied to these teeth.

Some operators, including myself, have attempted to show by the means of radiographs that the median maxillary suture has been opened. Our radiographs have failed to prove that the suture has been opened except between the premaxillaries.

In answer to Dr. Brown's argument that the suture has been opened because the central incisors were moved apart, I would say: It is often the experience of an orthodontist when widening the upper dental arch—especially by means of the appliance known as the expansion arch—that if he ligates the canines to the wire arch without ligating the incisors, a space will soon develop between the central incisors. I can explain it from a fact which I discovered a number of years ago while studying the suture between the premaxillaries by means of the radiograph,* that this suture was open in depths of from one-third to the full length of the central incisor roots in two-thirds of the cases examined.

Dr. George Wright of Boston, in June 1911 issue of the DENTAL COSMOS, reports:

> Up to the spring of 1910, I could safely say that in some instances I have known the intermaxillary and palatine suture to be unossified and susceptible of comparatively easy separation as late as thirty-five years. When I discussed this question with Professor Hirdlicka of the National Museum at Washington, where I examined many skulls, he agreed with me, and showed me some skulls of Eskimos whom he had known when living and of whose age he was sure. These were as old as fifty years, and showed distinct evidence of intermembranous tissue in the intermaxillary suture and no evidence of ossification. A skull in his collection illustrating this is numbered 226,152. There are many others.

My studies with the radiographs confirm Dr. Wright's observation in as far as the open suture applies to the premaxillaries.

A WARNING IN INTERPRETING RADIOGRAPHS.

I wish to caution against accepting evidence furnished by radiographs unless very carefully and skilfully made, and then interpreted as skilfully. A thick nasal spine or vomer may give the impression that the suture has been opened, as illustrated by a case where the dense walls of the nasal spine were caught on edge so as to stop the rays, while the light penetrated the thinner cancellated bone between these plates easily, giving the appearance of an open suture in this region.

RAPID OPENING OF THE SUTURE POSSIBLE IN YOUNG CHILDREN—YET NOT BEST.

While I have been unable to secure proof that the median maxillary suture has ever been opened by rapid widening of the dental arch, yet I believe it may be possible to do this in the cases of young children; but it is in these cases that we can secure most beautiful results by gradual tooth movement, thus stimulating bone development, which is not alone along the lines of the sutures but in the body of the bones as well, and in this we are working along physiological lines—aiding nature to attain the normal, and not abruptly attempting to open the suture and practically producing a fracture by widening the arch in two weeks' time, as Dr. Brown recommends. Neither is the actual time of treatment shortened, for all the teeth must be placed in their normal positions whether the arch be widened rapidly or slowly. Then they must be retained for a year or two. *The shorter the active period of treatment, the longer the period of retention, for the teeth must be supported until nature builds permanent bone retainers.*

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* The results were given in a paper read before the Alumni Society of the Angle School of Orthodontia at St. Louis, December 1906, and published in the *American Orthodontist*, vol. i, No. 1.

Dr. Albin Oppenheim of Vienna, after extensive investigation, has shown that by the application of powerful forces as in the rapid widening of the maxillary arch, the vitality of the periosteum is so lowered that a long period of time is required to repair normal physiological conditions so it may transform the new bone to retain the teeth.*

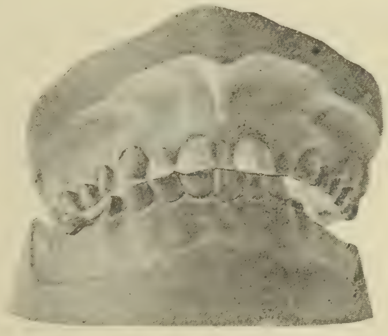
Dr. George Wright has designed an instrument for measuring the nasal space, as also Dr. Lee W. Dean of Iowa City, and although there is chance for error in the use of these instruments, they confirm the rhinologist's observations of increased nasal space, especially in the case of Dr. Wright's instrument when he measures between the naso-antral walls at a point beneath the inferior turbinates.

In regard to patients sixteen years of age or older: We have reliable data that the nasal space has been increased in size from the rapid widening of the dental arch, yet we also have reliable reports from rhinologists that the breathing-space has been improved in these older cases where the more gradual widening of the dental arch was practiced. I believe that in both cases the improvement in breathing was due to development as a result of the stimulation upon the maxillary bones of placing the oral cavity under the influence of normal forces so that it could functionate properly.

WIDENING THE MANDIBULAR AS WELL AS THE MAXILLARY ARCH.

I think that all the gentlemen who advise the rapid widening of the maxillary dental arch also advise widening of the lower arch if that is constricted, as well, so that the upper and lower teeth may occlude properly. That this has not always been practiced is evident from this case (Fig. 7), in which the upper buccal teeth were pushed out until they occluded outside the lowers, and until the central incisors were separated.

Fig. 7.



History of case reported by Dr. M. N. Federspiel of Milwaukee:

> A lady about nineteen years of age reported to my office about a year ago. She consulted a rhinologist about five years ago on account of suffering from an acute suppurative inflammatory condition of her nose. Her rhinologist informed her that she had a deflected septum, and suggested to her that it could be straightened by radically expanding the upper arch. She was directed to a specialist, and an appliance was placed in her mouth with jackscrews, and the upper arch widened in about two months, causing her centrals to separate. Nothing was done to the lower arch. She wore a retainer

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* *Amer. Orthodontist*, January 1912, page 29.

for a year and was discharged cured. Upon examination, I found that the septum was still deflected, but the nose otherwise normal. I asked her if it was easier for her to breathe since the arch was expanded, and she said that she could not notice any difference. . . .

A result like the one shown in Fig. 7 leaves the oral cavity in a condition which is a greater menace to health than the nasal condition could have been.

I believe we cannot hope for any permanent benefit from this operation unless the teeth are left in their normal relations, so as to be under the influence of normal forces and stimulate normal function.

ABSORPTION OF ADENOID TISSUE NOT HASTENED.

As nearly as I have been able to determine, absorption of adenoid tissue is not hastened by the widening of the maxillary dental arch and the consequent increase in the size of the nasal cavity.

In my own experience adenoid tissue has increased in size in at least two cases while the patients were under my care; in other words, colds and infection more than counterbalanced any beneficial effect that expansion of the dental arch might have had upon the adenoid tissue. A number of instances have been cited where adenoid tissue has atrophied, or partially so, during the widening of the maxillary arch, but it was at the time of puberty, so was probably not due to the intervention of the orthodontist. Also, direct benefit to the tonsils from orthodontic work does not seem to result, unless it would be less likelihood of infection of the tonsils by the orthodontist's changing a mouth-breather to a normal breather.

INTERDEPENDENCE OF RHINOLOGIST AND ORTHODONTIST.

To be of the greatest benefit to humanity the rhinologist and orthodontist must work together, for the work of one often supplements that of the other. The orthodontist cannot hope for permanent success in a case where mouth-breathing has caused malocclusion of the teeth, unless the rhinologist removes the primary cause of the mouth-breathing. Our most careful operators explain this when starting a case, and insist on the removal of adenoids and tonsils if necessary. It would be well if the orthodontist were as competent as the average rhinologist to make diagnosis of nose and throat conditions. (You will notice that I say rhinologist, and not physician—for sometimes our patients will consult the family physician instead of the rhinologist, and bring a clean bill of health as far as nose and throat conditions are concerned, and we find that the child is suffering from nasal obstruction.) Then, too, the orthodontist would be better able to advise the patient, and would understand the conditions with which the rhinologist has to contend, and be less inclined to blame the rhinologist while struggling to correct the malocclusion of an unusually obstinate mouth-breather.

The rhinologist is dependent upon the orthodontist in many cases. The best-informed operators will not do an adenoid or tonsil operation, after the adenoid tissue has caused maldevelopment of the bones and tissues of the nose and mouth, without explaining how futile it is to hope for any great benefit unless the patient also receive orthodontic treatment. In younger patients suffering from a deflection in the cartilaginous portion of the septum, the operator will ascertain if the maxillary arch should be widened, to allow the nasal cavity to develop and the septum to straighten, before an operation is performed. It would also be well if the rhinologist were as competent to make diagnosis of malocclusion of the teeth as the average orthodontist—not dentist, for the average dentist is no more competent to make diagnosis of these conditions than the average physician is of nose conditions. I believe that the time will soon come when there will be a chair of orthodontia in medical schools, especially postgraduate schools of laryngology and rhinology, just the same as there are chairs of rhinology in our best schools of orthodontia. Then reasons for the continuance of mouth-breathing after operations in many cases will be understood, and habit will not be made the scapegoat.

Today, our patients are not receiving the full benefit of modern science unless they have an opinion from both the rhinologist and orthodontist. The practitioner who, in the cases we have discussed, does not bid the patient consult the other specialist, be he orthodontist or rhinologist, is occupying a position that is *indefensible.*

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SOMETHING ON CAVITY PREPARATION FOR THE GOLD INLAY.

By Dr. J. V. CONZETT, Dubuque, Iowa.

(Read before the National Dental Association, Section I., at its annual meeting, Washington, D. C., September 10, 1912.)

FIVE years of observation and use of the cast gold inlay have demonstrated the fact that it is one of the most useful and beneficial methods for the restoration of lost tooth tissue that has ever been given to the dental profession. It is not only a boon to the dentist, in that it enables him, in a positive way, to fill difficult large cavities in molars and bicuspids with gold without the tremendous stress upon his own and his patient's vital forces, but the ease of the insertion of an inlay from the standpoint of the patient has made the latter largely lose his fear of dental operations, and has been the means of our being able to use gold for the restoration of lost tooth tissue in cases where we were not able to do so before the advent of the inlay, because of the patient's refusal to stand for the prolonged operation under the rubber dam made necessary by the older method.

THE CAST GOLD INLAY *vs.* THE MALLETED GOLD FOIL FILLING.

If the gold inlay were ten per cent. less durable than the gold filling, we would still be justified in using it in a great many cases, because of the great stress that the making of a large gold filling entails in certain nervous individuals. I do not grant that it is any less good than the gold filling, however, for while I know that there is no better preservative of the tooth than a good gold filling, I am confident that a good gold inlay is equally as good as, and a poor gold inlay is infinitely better than a poor gold filling. I once had the pleasure of visiting the office of one of our great gold operators, and while I was there a patient came in for examination who had in her teeth a number of the worst gold inlays that it has ever been my experience to observe. This dentist immediately called our attention to them, and began a tirade against the inlay in general. It was about as fair to compare those inlays with a good gold filling as it would have been to compare a poor, leaky gold filling with a well-made gold inlay. And yet poor as these inlays were —and they were so poor and the margins so wide that I do not see how any operator could possibly have made them from models obtained from the cavity which the inlays were intended to fit—there was no evidence of caries around them, and they were still preserving the teeth. Had they been gold fillings of equally faulty technique, the teeth all around the fillings would have been in an advanced state of caries, but, as it was, the cement was still preserving the teeth. How long it would have done so is a problem, but the probability is that before long there would have been a recurrence of caries around those inlays.

CARE AND SKILL REQUIRED FOR CAST GOLD INLAYS THE SAME AS FOR GOLD FILLINGS.

The making of a gold inlay is an easy method only when the principles underlying the method are properly observed and carried out. The fact is, that any method is easy when the technique thereof has been mastered, and any method is difficult when the operator is not familiar with its use. The examination that is difficult to the school boy who has not been a diligent student is a snap to the one who has carefully mastered his lessons as he has progressed in his school term; the method of the master is easy to the latter, but is one of profound impossibility to the careless, indifferent botcher. A gold inlay, to be a perfect preservative of the tooth, requires as much care and as perfect a technique as does the making of a gold filling, and the operator who is simply looking for easy methods as a short cut to easy money will find himself running up against innumerable failures and a certain and sure loss of reputation.

Honesty in operative dentistry is the best policy, just as sure as it is in any other business or profession, and the man who carelessly makes a model in an indifferently prepared cavity, casts an ill-fitting inlay for that cavity, and then trusts to the cement to cover up his shortcomings, will succeed for a while, for the cement will do the work that his skill should have done, but in the fulness of time there will be a reckoning, and he who has neglected will not escape the just reward of his misdeeds.

I am led to the foregoing by reason of the fact that there is a disposition on the part of some careless operators to slight their inlays, because they feel that it is not so necessary to be careful of each step as it is in the making of a gold filling. They know that in the making of a filling a faulty technique will immediately, or very soon, disclose itself; but because the faulty inlay does not at once cry out against them, they fall into shiftless and evil habits. Emerson has well said that we are all as lazy as we dare be, and I would warn men that have a tendency to cut corners in the making of their inlays that here they *dare* not be lazy, or the consequences of their laziness will overtake them.

The gold inlay is a magnificent method of restoring the tissue that has been lost by the ravages of caries, and it is so good a method and one fraught with so much good to humanity that I wish to raise my voice against the tendency manifested by some representatives of our profession to employ this method in a careless and indifferent manner, thereby bringing the method into disrepute through no fault of its own. Each step in the making of an inlay must be as carefully considered and as carefully carried out as in the making of a gold filling; and if that is done, and the scientific methods that have been wrought out in the other lines of filling are projected into the filling of teeth with the gold inlay, there will be no occasion for failure or for apology in the use of the inlay method.

CAVITY PREPARATION.

When I say the methods that have been worked out in the making of fillings, I mean the proper cavity formation, the proper contouring of the filling or inlay, the proper saving or restoration of the interproximal space, and the proper finishing of the inlay. It will not be possible for me to enter into a discussion of the whole question in a paper that must, of necessity, be short; so I will content myself with a discussion of some of the points in cavity preparation that I think need emphasis, and point out the importance of a proper contour of the filling.

No one who is at all acquainted with any of my writings on this subject needs to be told that the method that I present is that which the great master of operative dentistry, Dr. G. V. Black, has given us, and I wish at the outset to give him all of the credit for anything that I may have done in the matter of awakening an interest in the subject of a scientific cavity preparation for the reception of the gold inlay.

HISTOLOGICAL AND FUNCTIONAL CONSIDERATIONS ESSENTIAL IN CAVITY PREPARATION.

In the first place, we should all cultivate the habit of carefully studying the conditions that we are called upon to correct. That requires from us a knowledge of the structure, form, and function of the part that we are to restore; for if we do not know the histological structure of the material upon which we are to operate, how can we intelligently fulfil our mission as restorers of that material? How can we in the best manner cut and shape a material of whose structure we are ignorant? We should have an intimate knowledge of the structure and morphology of the enamel, that we might to the best advantage follow the lines of cleavage in the working of the same and in the protection of the structure with our filling material.

We should know the structure of the dentin in a most intimate manner, so that we might know how best to operate upon it with the least pain to the patient and the greatest ease to ourselves. If we thoroughly know the condition of the tooth structure in health, we shall be able properly to differentiate between the pathological and the physiological aspects of tooth structure, and will know when we have reached sound, safe territory, but if we do not know the difference between the sound and the diseased tissue, where will we draw the line in our excavations? This will emphasize the necessity of a careful study of the histology of the dental structures as a preliminary to good restorative operations.

We must know the proper arrangement of the teeth in the dental arch and the relation of each tooth to its neighbor and occlusal antagonist, that we may be able to discern and correct the malposed and maloccluded teeth that we are called upon to restore with a filling or inlay. Someone may ask, What has that to do with the filling of a tooth? I answer, Everything, for if we do not know the proper relation of each tooth to its neighbor and antagonist, how are we to restore a proper condition of approximal relation and occlusal contact? And if we fail in the former, we invite a continual discomfort from crowding of the food between the faulty contacts that our ignorance has led us to make; and if we fail in the latter, we fail to restore to the patient the proper grinding surface which it was our duty to give him.

It is necessary to know the amount and the direction of the occlusal force that the patient naturally exerts upon the surface which we are to restore, for if we do not properly calculate the amount of stress that is to be exerted upon our finished product, we will be liable to error by not providing a sufficient retention and resistance to our filling, and the filling will be displaced, or the whole tooth may be broken.

The prime requisite, then, in the formation of a cavity for the reception of a filling or an inlay, is a proper study of the conditions involved, and then an intelligent application of the proper methods for the functional restoration of the lost tissue; for if the function of the tooth is not fully restored, we miss that for which our profession was called into existence, and have no right to call ourselves dentists, viz, restorers of lost tooth tissue.

Having a knowledge of the conditions involved in the restoration of a tooth that has been attacked by caries, we apply the principles that we know will to the best extent remedy the evil.

I am led to emphasize the necessity for a study of particular conditions and an individual attention to each tooth that is presented to us for correction—rather than a general lumping of all cavities into one class, with a view merely to the filling of the tooth and the collection of the fee—because I am constantly seeing bad results due to failure to observe or to neglect to correct a condition that made possible the decay of the tooth in the first place; and, of course, if the original condition that caused the defect is not remedied, there is bound to be a recurrence of the defect in a shorter or longer space of time.

"EXTENSION FOR PREVENTION" IN CAVITY PREPARATION FOR GOLD INLAYS.

It is not advisable to go into the etiology of caries at this time, further than to say that we know that caries is caused by a bacterial invasion of the tissues, and that this invasion is found to take place along well-defined areas of the tooth substance. These areas are the ones that are not habitually kept clean, and the consequence of such observation is the slogan of the oral hygienist—"Clean teeth do not decay." If that is correct—and it is, to the extent that teeth surgically clean cannot decay—then it is our duty as operative dentists to make our operations in such a way that the margins of our fillings or inlays will be in the area that is habitually kept clean. This is a reasonable demand, one that all men ought to be willing to subscribe to, and it is all that is meant by the doctrine of extension for prevention. An inlay to be safe must have all of its margins in safe territory; particular attention should be given to the linguo-gingival and the bucco-gingival angles, for while it was a very frequent error in the making of fillings to have these angles so far within the embrasures that they were in unclean territory, and were as a result the places where we found the most frequent cases of recurrence of decay around the fillings so made, it is even more frequent in the inlays that have come to my attention. Some operators seem to think that it is necessary to give the cavity a cone shape, so that the inlay wax will draw and the finished inlay will go properly to place. Such is not the case. As long as there is no undercut the wax will draw, and the best form that we can possibly give to our inlay preparation is the one that approaches the box form, that is, a cavity with flat seats and parallel walls. If the cavity is so made and the buccal and the lingual axial marginal line from the occlusal to the gingival surface is a straight one, and parallel with the one on the opposite side of the tooth—that is, if the buccal and lingual axial lines are parallel—then, if the margin at the occlusal surface is in clean territory, the angles at the gingival surface will also be in safe territory; but the prevalent form is the one that allows the lines to converge gingivally, and the consequence is unsafe bucco- and linguo-gingival angles.

FLAT SEATS.

Another defect that is a common one is the error of making a rounded gingival seat. I have heard operators who ought to know better take exception to the doctrine of flat seats, after I had advocated them in a lecture, and they advised the making of the seats with a round bur, and leaving the shape so obtained as the gingival aspect of the cavity. I have never heard a satisfactory reason given for such a procedure further than that it had been the method of the said operator for years, and he had seen no reason to abandon it. A poor reason, and a poor operator that cannot see a scientific reason for changing a method that he has used, only because he has used it for years! Mechanically it is so obvious that a flat seat offers a firmer base than a rounded one that it is foolish further to discuss the matter. Furthermore, if an inlay or filling rests upon a concave seat, such as would be made with the advocated round-bur preparation, it will have a tendency to rock in the direction opposite to the point of stress that is placed upon it; that is, if the point of stress comes to lie upon the linguo-occlusal portion of the filling, the inlay will have a tendency to yield toward the bucco-gingival surface, and the great stress will be borne by the buccal wall of the tooth, and, if that wall is not strong, it will have a tendency to break at that point, and frequently does so. If the stress comes in the other direction, the force will be delivered upon the lingual wall, and that will be the one that will break; while, if the inlay is firmly seated upon a flat seat, the entire stress will be delivered upon the flat seat, and there will be no tendency to rock and far less probability of the breaking of the wall. All seats should be made flat, not only the gingival seat, but the seat made by the occlusal step. These seats may be made with an inverted-cone bur, which is the way in which I make mine, despite the fact that after I had made that public statement I was told that no man could make a flat seat with an inverted-cone bur and not make undercuts. It is dangerous to say, dogmatically, that no man can do that which you may have failed to do. It *is* possible, and is a very good way to make a flat seat with an inverted-cone bur, but it is necessary to be careful, of course, that no undercut is made. After the seats are made roughly flat with the bur, they may advantageously be planed with a chisel to produce smoothness of the dentin.

FORMATION OF CAVITY WALLS.

The walls of the cavity should be as nearly parallel as it is possible to make them, so that there may be a maximum of frictional resistance to displacement. It is a decided mistake, and one fraught with the largest percentage of failure, to depend upon the cement for retention. We must have cements (and cement and cementation are great problems, which have been very well worked out by our manufacturers), but they were never intended entirely to hold the inlay in the cavity, and that inlay will hold best which has the best mechanical retention. A cavity that is cut sufficiently deep, and the walls of which have been paralleled, will be in no danger of dislodgment from the stress of mastication. Not only must we have flat seats and parallel walls, but, as I have already intimated, the cavity must have sufficient depth to enable the gold to have body enough to make the frictional surface sufficient to do some good. I have seen a good many inlays fail for the reason that the cavity was hardly cut through the enamel, and, as a consequence, the finished inlay did not have sufficient body to offer any frictional or cemental hold.

INTERPROXIMAL SPACE.

In discussing a lecture which I delivered some time ago, a gentleman said that we wanted to so make our fillings and inlays that the food would be forced into the interproximal space. I did not correct him at the time, for I was sure he did not mean what he said, for it is just that that we do *not* want, and I would not hesitate to remove a filling or inlay that was allowing the food to crowd into the interproximal space, for if it did so it would be a failure. It would cause the patient untold misery, and would set up an irritation of the gingivæ that would end in a bad case of pyorrhea. What we do want, however, and what the gentleman in question evidently meant, is that we want to make our fillings and inlays so that the food will be forced through the embrasures, occluso-gingivally, and thus passing over the margins of the filling keep them in a constant state of cleanliness and polish, with consequent freedom from any danger of a recurrence of decay. This can only be accomplished if we extend our cavities sufficiently far bucco-lingually to bring the margins into the territory that can be so kept clean.

CAVO-SURFACE ANGLE.

The making of the cavo-surface angle is the last, and one of the most important parts of the preparation of the cavity for the reception of any filling. It is important, in that, if there is any recurrence of decay at any time, it is at the cavo-surface angle that the decay begins, and obviously, if this part of the cavity is invulnerable, the whole filling is permanently secure. We have already considered the placement of the margins in safe territory, so that it only remains to take up the subject of the shaping of the margins. We will find that there are two objects to be considered in the shape that we give to the margins in the preparation for an inlay—that of the protection that will be given to the enamel, and the shape that will be given to the edge of the finished inlay as a result of that which is given to the margin.

In the butt margin we find that there is no protection given to the enamel rods in many places, and that, as a result, short rods will fall out under stress and leave a vulnerable place in the margin that will, sooner or later, cause the destruction of the inlay; and, coming down flat upon the margin, it leaves no possibility for the burnishing thereof, and in case of a shrinkage will leave a slight discrepancy between the inlay and the tooth. All of this is obviated in the beveling of the cavo-surface angle, for in so doing the short enamel rods are eliminated, leaving the enamel surface in the best possible shape to resist stress without outside help, and then the resulting shape given to the margin of the inlay —that is, the flange on the margin—not only locks in the enamel rods, but is capable of being burnished down to the margin of the tooth, pinching off the line of cement and hermetically sealing the tooth with gold all around the margins of the cavity. The angle should not be so obtuse that a long bevel will be given to the gold, for if so, the thin flange of gold will not have sufficient strength to resist the stress that may come upon it, and as a result it will curl up, and defeat the very object it was designed to accomplish. The method of obtaining the cavo-surface angle is to go over the entire surface with a sharp, chisel-like instrument. Dr. Black has designed a number that admirably serve the purpose, and I can do no better than to recommend the marginal trimmers that go with the Black cutting instruments.

The manner in which the filling or inlay is finished plays a very important part in the amount of cutting that is necessary to bring the margins into safe territory, for if the contact is broad and flat, the margins will have to be extended a good deal farther to bring the margins of the filling out of contact with the approximating tooth, but, if the contact is made small and round, and as a consequence all of the surfaces of the filling are sloping toward the contact point, then the width of the cavity need not be nearly so great to clear the margins and have well-defined embrasures through which the food will pass in its excursions over the teeth in mastication, and yet, while passing over the margins with a good deal of frictional force, it will, by reason of the rounded contact, be kept from forcing itself into the interproximal space.

There are so many problems entering into the making of a good inlay that one might spend an entire day in attempting to discuss them. I have therefore attempted to emphasize only a few of the mistakes that have been forced upon my attention by the constantly recurring failures which are being experienced by operators in all parts of the country.

A careful study of all the conditions that present themselves to us, an individualizing of each operation that we make, a careful employment of the knowledge of cavity preparation that Dr. Black has given us, and a restoration of contact and interproximal space, will make for such an improvement in the general operative technique that, if this paper will in any measure contribute to the general adoption of the above principles, it will amply fulfil its purpose.

[See also *Discussion,* at page 1367.]

TREPONEMA MUCOSUM OF PYORRHEA ALVEOLARIS.

By **PERCY R. HOWE, D.D.S., Boston, Mass.**

THE bacteriology of pyorrhea alveolaris has for many years been the subject of much study, with very indifferent results. It is true that while the announcement of the discovery of some special and characteristic micro-organism has been heralded from time to time, only to prove chimerical, there have nevertheless been isolated several in connection with this disease.

The discovery of a new species of bacterial life from pyorrhea alveolaris by Hideyo Noguchi, M.D., in the laboratories of the Rockefeller Institute for Medical Research, is of the greatest interest to our profession. This eminent investigator has succeeded in cultivating and carrying out research work with a pure growth of a mucin-forming spirochæta. It is this organism that is responsible for the fetid odor that accompanies this pathological condition. This species is not truly parasitic, but requires an injured state of tissue for its growth, when it exerts its pyogenic action.

This accords with the views of those who have held that pyorrhea alveolaris is preceded by an irritated, bruised tissue, just as it has been shown in studies in cancer growth, that pre-cancerous tissue is a degenerate one. In this sense it is reasonable to suppose that a tissue strained by the deposition within its structure or by a continual attempt to eliminate excessive or imperfectly oxidized nutritional material, furnishes a suitable media for the proliferation of the micro-organism that the discoverer has termed *Treponema mucosum.*

It seems, then, that a first care in connection with this morbid affection is to recommend concern on the patient's part to avoid methods that cause a bruising or an irritation of the gum margins, in efforts to attain cleanliness, lest they engender the very requirements best suited for the development of these spirochætæ.

It is a further care to point out the necessity of following a *régime* of living that avoids the production of a degenerate or weakened tissue in the parts that are likely to become attacked. In the matter of dietaries, it is well to have in mind the matter of nutritional balance, as a general consideration and before entering upon more specific suggestions, for this is a basic factor in the problem of imperfect oxidation.

The products and tissue effects of intestinal fermentations, which receive so much attention in general practice as prime agents in a variety of bodily ills, demand attention equally in the cases under discussion. Many other general and local conditions become evident and suggestive to the practitioner who makes a thorough study of the peculiarities of the individual case.

The great variety of things that tend to irritability of gum margins and alveolar regions that come under the regular order of observation in the dentist's care of the teeth, should receive his professional attention. Efforts at correction, irregularities, faulty fillings, lacerations of these regions in dental work, and deposits of tartar, are to be included in the category of things that bring about a favorable condition for the growth of this species of bacteria.

There is nothing in the disclosure of the actions and requirements of this organism of Dr. Hideyo Noguchi's that calls for a change in our method of treatment for cases that are well begun, and the usual procedure is too well-known to need repetition here.

Free bleeding in the actual surgical work may be accounted sound treatment from the standpoint of immunity, inasmuch as it voids the blood that has been long in contact with bacteria—and with the defensive powers of its leucocytes weakened, so that they no longer perform their office of intracellular digestion but themselves become the prey of the invading germs; while, on the other hand, it allows a fresh supply of blood, with its bactericidal properties intact, to enter the field.

It is well to remember the general nature of the deposits that accompany this disease, namely, that they are colloidal or albuminoid in part. In the early tendencies in this direction, washes of neutral and alkaline salts are to be recommended, for these do not coagulate, but are solvent of such substances before they become too resistant. This I have more fully spoken of in an article in the DENTAL COSMOS for January 1905,* entitled "The Value of Dilute Saline Solutions in Oral Hygiene."

This treponema is anaerobic and requires the "presence of serum constituents for its growth." Full details of the culture are published in the *Journal of Experimental Medicine* for August, and contains matter of first importance for those who are attempting to attain results by opsonic treatment.

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* See DENTAL COSMOS for January 1905, vol. xlvii, p. 52.

PREPARATIONS FOR THE TOILET OF THE MOUTH AND TEETH.

By L. F. KEBLER, M.S., M.D., U. S. Department of Agriculture.

(Read before the National Dental Association, in general session, at its annual meeting, at Washington, D. C., September 10, 1912.)

I CONSIDER it a great honor and privilege to address the members of this association on a subject of such vital importance to the general health of the American people. The invitation to take part in the proceedings of your convention stated that "Dentifrices" would be the subject for discussion. I believed the term "dentifrices" too circumscribed to cover the subject in mind adequately, and for that reason have chosen the above title for the topic on which I am about to speak.

Nevertheless, the term dentifrices appears so elastic at present that it may be applied to any agent used for cleansing the teeth or mouth, or for preventing and treating disease of the teeth and gums.

PREVALENCE OF DENTAL CARIES.

The members of this association are continuously inspecting mouths. All of us have teeth the greater part of our natural days, and all present believe that the care of the mouth and the preservation of the teeth are of vital importance for the maintenance of good health. It appears to be a well-recognized fact that the stability of the teeth is undermined in proportion to the advancement of civilization. One of the causes for this deterioration is undoubtedly the diminished use of the teeth on account of the many prepared foods available, which require little mastication. It is a law of nature that an organ develops and is valuable in proportion to its use; atrophy and disease usually attack useless and unfit members of the body.

ORAL PROPHYLAXIS IN HISTORY.

The need felt of caring for the teeth dates from remotest antiquity, when the care of the mouth and teeth was in the hands of the medical profession. There were then no such specialties as dentistry and stomatology. The Ebers papyrus contains prescriptions for what might be called dentifrices, of which the following is an example: Powdered flint stones, green lead, and honey. Caries of the teeth and some of the agents causing this disease were referred to by such men as Aristotle.

Prophylactic treatment was considered by Celsus, Pliny, and other early writers. During the fifteenth century, Giovanni of Arcoli formulated a dental decalog, the tenth commandment of which reads as follows: "The dentifrices to be used last thing at night or early in the morning." The nature of the dentifrices then in vogue does not appear to have been divulged, but it was well recognized that the use of very hard substances which abrade the teeth was to be avoided. From time to time there were conflicting ideas as to the use of highly acid agents for cleaning the teeth; for example, in the seventeenth century, Dr. Rivière advises cleaning dirty teeth with undiluted acids. The results of the use of these cleaning agents does not appear to be recorded.

Dr. Pierre Fauchard, in his book entitled "Le Chirurgien Dentiste," published in 1728, advises against the use of acids, and says in substance: "It is true these acids remove the débris from the teeth, but a little investigation will show that undesirable action upon the teeth has taken place." Fauchard refers to toothbrushes only to condemn their use. Dr. Bell of the eighteenth century advocates the desirability of using coarse, gritty dentifrices, even though their use resulted in the denudation of the enamel of the teeth. It appears that he believed that the enamel would regenerate just like the nails and hair. One of the foremost observers of the early nineteenth century, Dr. Joseph Fox, in his book entitled "The Natural History of the Human Teeth," vol. ii, page 32, 1806, refers to the secret of preventing dental caries as follows: "This delightful secret, although it is pretended to in the advertisement of every quack, we can only expect to acquire when the philosopher's stone and the grand panacea have been fulfilled." The question naturally suggests itself, How much progress has been made since the above utterance?

ANTISEPTICS IN THE COMBATING OF DENTAL CARIES.

The views in vogue in the United States during the middle of the last century were that acids, no matter whether introduced into the mouth or produced within the mouth, are injurious and tend to the formation of caries. It was also believed that it was necessary to keep the teeth absolutely clean by artificial means, and prescriptions for chalk dentifrices were given. This embodies the idea of antacids as a means of preventing dental diseases. Carious teeth, however, were as numerous as ever; in brief, the conditions were about the same as in the days of Fox. The above represented the situation before the great discoveries of Pasteur, the observations made by Miller, and the epoch-making discoveries of antiseptics and aseptic surgery. The question naturally arises: Has any material progress been made as the result of these discoveries, and, if so, what is it? After learning of the beneficial inhibiting effects of the antiseptics on the activities of bacteria, it was naturally believed that here was the means by which the bacterial flora of the buccal cavity could be controlled or stayed, if not absolutely destroyed. Experiments, however, soon showed that it was impossible to sterilize the oral cavity, or even to appreciably diminish the number of bacteria without using the drugs in such strengths as to make them intolerable, if not absolutely dangerous, either because of their disagreeable odor and taste, or because of their effects upon the mucous membrane and their toxicity. The idea was similar to the fallacy developed relative to destroying tuberculous germs in the lungs by the introduction of germicidal agents. It is a very simple matter to inhibit the growth of, or destroy the bacteria in a test tube with certain agents, but to introduce these potent toxic agents into the human lungs and bring them sufficiently into contact with the organisms so as to destroy the bacteria is quite another matter. It is now a well-recognized fact that no germicidal agent can be introduced into the lungs of sufficient strength to have any material influence whatever upon the germs causing the disease. While the same is undoubtedly true of certain bacteria of the mouth, yet there is no doubt that the chances for their destruction in this location are more favorable. It is a well-recognized principle in bacteriology that the greater the dilution of a germicide, the longer the time of action necessary to destroy the bacteria, and *vice versa*. From the necessary dilution already considered, it is quite evident that none of these germicidal agents can avail much in sterilizing the mouth, and that antiseptics are of correspondingly little actual value.

DIFFICULTIES OF NEUTRALIZING THE ACIDS IN THE MOUTH.

Almost every dentifrice, paste, or mouth-wash is advertised and heralded to the public and trade on the basis of its supposed antiseptic value. With the advancement of bacteriological observations, the idea still prevails that caries is largely due to the action of acids upon the teeth, but the idea of bacteria developing as a result of the activity of the acids has been proved incorrect, in that it has been clearly demonstrated that the action of the bacteria upon the food particles which insinuate themselves between the teeth is the cause of the acids. If this is correct—and there is at present no reason to believe the contrary—it would appear to be a very simple matter to provide for the difficulty, either by keeping the mouth absolutely clean so as to prevent bacterial action, or by introducing some agent into the mouth which would neutralize the acids as formed. In practice it is virtually impossible to carry out the former, and the latter has certainly not been put on a satisfactory basis.

ACIDS IN POPULAR MOUTH-WASHES.

An examination of the mouth-washes commonly used shows that a goodly number contain free acid; in some instances the amount is fairly liberal, in view of the fact that acids are considered as a contributory if not the actual cause of dental caries. In this connection I desire to call particular attention to one of the most commonly used mouth-washes available, namely, hydrogen dioxid. This article is probably more freely used by the public at large than any other, or all tooth-washes combined, and for this reason should be of such composition as to represent the maximum of efficiency and the minimum of harm. Its manufacture is free to all. On referring to Bulletin No. 150 of the bureau of Chemistry, entitled "Technical Drug Studies," pages 12 to 14, it will be found that the amount of free acid present in the available brands of hydrogen dioxid—of which there are about forty—varies from 1.5 cc. of N/10 calculated as sulfuric acid for each 25 cc. of the product, to 10.7 cc. acid for the same amount. From the present status of our knowledge, I believe that hydrogen dioxid of proper quality is the best artificial mouth-wash available.

ALKALINE DENTIFRICES.

Under normal conditions saliva is considered the best mouth-wash. It acts during the entire 24 hours of the day and 365 days a year; artificial agents at best act only during a few minutes per diem. The cunning of man has not as yet succeeded in preparing the equal of saliva for use as a mouth-wash. It is alkaline in reaction, and therefore tends to neutralize certain amounts of the acids that may be produced as the result of bacterial action. A majority of the dentifrices, pastes, and mouth-washes are alkaline in reaction, the idea being that these antacid products will neutralize the free acid of the mouth. It is self-evident, however, that the amount of these alkaline substances that may be introduced into the mouth is very small, and can act only over a very limited period of time, particularly when compared with saliva. One of the specific objections raised to these alkaline products is that alkalis tend to diminish the flow of saliva, and cause stagnation in the mouth.

Powders containing the dioxids have been placed on the market during recent years. Theoretically, great results might be expected, as in other dentifrices. It would seem, however, that the dilution, as in all others, is too great to give them any material advantage. The chemical most commonly employed as a base for dentifrices is calcium carbonate. Experience seems to show that this substance is best suited for this purpose for the following two reasons: It neutralizes the free acids, and is not sufficiently hard to abrade the enamel from the teeth. Some observers contend, however, that powders are dentrimental as cleansing agents for the mouth, for the reason that they provide nuclei for bacteria and ultimately develop into the undesirable plaques.

DANGER OF COLORING AGENTS IN DENTIFRICES.

During the past few years some observations have been made relative to the deleterious influences of coloring agents commonly employed in dentifrices. One of the foremost workers in this line is Dr. W. H. O. McGehee of Cincinnati. Dr. McGehee expected to be present at this convention until a few days ago, when he wrote stating that it will be impossible for him to come to Washington on account of school work, but he forwarded me a number of specimens on which he had made observations. From these observations it appears that the use of coloring agents in dentifrices is fraught with danger. From what has been said above, it is clearly evident that the ideal tooth-wash is still to be found, and the question asked above—namely, Has there any material progress been made in dentifrices, tooth-pastes, and tooth-washes during the last half-century?—must in general be answered in the negative. Some will very probably differ with this conclusion; if so, the speaker would be pleased to be advised in what particular, with facts, the conclusion is erroneous.

STERILE WATER ADVOCATED AS MOUTH-WASH.

In surgical operations it has been found that sterile water is about as useful as many of the antiseptics and germicides employed. Taking all things into consideration, it would appear that sterile water for rinsing the mouth, accompanied by the use of some instrument which will remove the food particles, is the best means of keeping the mouth clean and diminishing the progress of dental caries.

TESTIMONIALS FROM DENTISTS CRITICIZED.

The members of the dental profession, it would appear, ought to be fully conversant with the above facts, yet on looking over the advertisements used in conjunction with the various dentifrices, pastes, and tooth-washes, it is found, with rare exception, that they are accompanied by indorsements and testimonials from medical men and dentists. It appears, also, that these testimonials are given at times on the most flimsy basis, of which the following is typical:

> October 20, 1908.
>
> *Dear Sirs,*—Your sample of tooth-paste was received in due time, and have found it the best tooth-paste of its kind I have ever used. Thanking you very kindly for the sample, I wish to remain,
>
> Yours respectfully,
>
> ...., D.D.S.

It is clearly evident that the above testimonial was based upon a sample which permitted observations only over a very limited period of time, and of necessity could have been used only in conjunction with a few patients. The circular from which this testimonial was taken contains twenty-six others. Other indorsements and recommendations are represented by the following:

> 'It has been thoroughly tested by some of the most eminent dentists in this country, who have without exception strongly indorsed it and proved it." "Indorsed by many of the medical and dental professions." "Used and recommended by the dentists of America as best for the teeth." "I most cheerfully bear testimony to the unrivaled excellence of .... for the teeth."

A DENTAL BOARD OF INVESTIGATION OF THE MERITS OF DENTIFRICES ADVOCATED.

The above represents information to serve as a guide in the examination of dental preparations. The members of the dental profession know, or should know, these facts. It is to the members of your profession that we look for support in our efforts to eradicate false, deceptive, and fraudulent products from the market. It therefore behooves the dental profession to take such steps as may be necessary to discontinue the indorsements of products which, as they ought to know or could know by a little investigation, are not as represented to the public. If the members of the dental profession are not willing by such action to protect the public health, it is a most difficult problem for those charged with the enforcement of the laws to eradicate false and deceptive remedies. There is no difficulty whatever on our part in attacking palpable frauds, but when the advertisements are arranged in such manner as to deceive by the indorsement of the members of the dental profession, the problem becomes a most difficult one. In view of the conditions obtaining, I take the liberty of recommending that there be appointed in this association a committee to take this matter under consideration, and to report at a subsequent meeting.

ON THE IMPORTANCE OF ORAL HYGIENE IN COMBATING TUBERCULOSIS.

By **Dr. VINCENZO GUERINI**, Naples, Italy.

(Read at the Seventh International Anti-Tuberculosis Congress, held in Rome, Italy, April 14–20, 1912.)

THE extent and importance of the matter to which I desire to draw your attention would properly demand a much more ample development than is possible within the limited space of time assigned to me; I shall therefore endeavor to put before you only the more salient points of the subject, and that as briefly as possible.

TUBERCULOSIS DANGEROUS ONLY IN PERIODS OF WEAKENED RESISTANCE.

It is generally known that tuberculosis almost exclusively attacks weak organisms; it is also well known that the chief indication in its treatment is to improve general nutrition, or, in other words, to strengthen the organism, which in fact possesses efficacious means of defense against tuberculous infection so long as its nutritive processes are normal. So true is this that most individuals who have contracted this infection during their infancy do not manifest its effects by any serious form of the disease, and they recover very easily, thanks to the said normal means of defense in the organism. There are, however, an immense number of children and young people who succumb to tuberculosis, because the weakness of their organism renders them incapable of resisting the infection; as there are also a very great number of adults who die of tuberculosis, either because a temporary weakness of the organism, by whatever cause produced, renders possible the re-awakening of a latent tuberculosis contracted during infancy, or because their weak condition prevents them from offering resistance in the event of a recent tuberculous infection.

We gather, then, that tuberculosis, in general, is dangerous only to weak or debilitated organisms, and that this is the case in infancy as well as in all the successive periods of life.

DEBILITY CAUSED BY DEFECTIVE DENTAL AND ORAL CONDITIONS.

Now, one of the chief and most common sources of weakness is dental disease, and more generally speaking, unhealthy or unhygienic conditions of the mouth.

Those individuals, whether children or adults, whose dental system is in a defective state do not masticate their food properly, nor is it properly insalivated, and in consequence of both these facts it is also poorly or incompletely digested. And digestion being the first phase of the whole nutritive process, it is to be easily understood that the bad state of the dental system, by interfering with digestion, inevitably ends by damaging every one of the nutritive functions, including sanguification, and so must necessarily give rise to debilitation of the organism, which in some cases may be slight and in others very grave.

It is, however, not alone in the mode above indicated that a faulty condition of the teeth injures the organism. The bacterial contents of the oral cavity are immensely increased by dental maladies, and also by the simple want of cleanliness. The detritus accumulated in carious cavities, the contents of gingival pockets, the filth that collects around the teeth of those who do not habitually make use of the tooth-brush—all offer excellent soil for bacteria culture, and the mouth, with its usual temperature of about 37° C., becomes under such conditions a real incubator of pathogenic germs, one of which, the tubercle bacillus, is known to be very frequently present in foul or unhealthy mouths.

Without doubt, the oral cavity is the portal of entrance for the greater part of the infections to which the human organism is liable. Even in healthy and clean mouths one meets with pathogenic bacteria, but in so small a number, relatively, as not to endanger health. Such bacteria, however, multiply extraordinarily in badly kept mouths, and then they constitute both a peril and a damage of the most serious kind, for they become very easily the source of various infections, one of these being tuberculosis.

DEBILITY DUE TO INFECTIOUS MALADIES AS FAVORING TUBERCULOSIS.

But, even not reckoning those cases, which are probably very numerous, in which the bad state of the mouth, by favoring the multiplication of Koch's bacillus, may become the direct cause of tuberculous infection through the easy passing of the specific germ into the lymphatic vessels or its penetrating the lungs with the inspired air—subtracting these cases, I repeat, it should be recognized that every infectious malady weakens the organism, and renders it, as long as this debilitated condition lasts, more susceptible of contracting tuberculous infection. In fact, how many patients, after an attack of influenza, or typhus, or inflammation of the lungs, become tuberculous! Hence it follows that the presence of dental maladies and the neglect of the teeth, by facilitating infections of various kinds, indirectly create, in many cases, a predisposition to tuberculous infection, or render possible the re-awakening of a latent tuberculosis.

ORAL PUS AND TOXIC MATTER FROM DENTAL MALADIES.

It should also be remembered that in the course of certain dental maladies that are very frequent, such as alveolar pyorrhea and necrotic processes, the subjects are continually swallowing, together with the saliva and with food, toxic products, such as pus and the toxins emanating from necrotic dental pulps; and this frequently causes dyspeptic disorders, gastro-intestinal maladies of more or less gravity, besides chronic auto-intoxications—all of which are conditions that weaken the organism and create in it a predisposition to contract tuberculosis.

From what has been said up to this point it clearly appears that dental maladies, and, more generally speaking, the anti-hygienic state of the mouth, in various ways predisposes individuals to contract tuberculosis—namely, by favoring, on the one hand, the multiplication of the tubercle bacillus, which, being present everywhere, enters the oral cavity with great facility; on the other hand, by weakening the organism, either through defective digestive and nutritive processes consequent on improper mastication and lack of the insalivation of food, or through actual and definite gastro-intestinal maladies of dental origin, or through chronic auto-intoxications derived from dental or peridental diseases, or, finally, through the infective maladies frequently arising from the great multiplication of the special pathogenic germs in diseased or uncleanly mouths.

If, now, you consider that in more than ninety per cent. of the population, children as well as adults, the mouth is in an anti-hygienic condition, either by reason of dental or peridental disease or of the absolute neglect of cleanliness, and in many cases from both causes operating at the same time, you may easily form an idea of the great significance which the existence of dental maladies and the want of hygienic care of the mouth must have in the general etiology of tuberculosis.

THE PRODUCTION OF CONGENITALLY WEAK OFFSPRING.

But there are yet other most important facts to be considered. Given the extreme frequency of dental maladies; given the absolute want of dental hygiene in a great proportion of the population; given, finally, the damaging effects often exercised by both these causes on the organism, it may easily be understood that the number of individuals more or less debilitated by the unhealthy state of their mouths must be enormous. No one fails to recognize, on the other hand, that debilitated individuals give birth to weakly offspring. Therefore, if the number of individuals who are in various ways debilitated in consequence of bad dental conditions be enormous, the number of cases of congenitally weak children procreated by such individuals must also be enormous. And these unfortunate creatures succumb with the greatest facility to tuberculosis, of which terrible disease, as everyone knows, congenital weakness is one of the principal causal factors—nay, perhaps the most important of all.

The disastrous effects which a bad condition of the teeth may produce in pregnancy as well as during the nursing period, and affecting, consequently, the child's conditions of health, are worthy of special attention. How can it be hoped that a woman shall rear healthy and robust children when she cannot masticate her food properly, when she is continually swallowing bacteria and toxins and her digestive processes are vitiated by reason of the diseased state of her teeth, and in consequence of all this her blood is impoverished and more or less altered by the presence of toxic principles! The woman whose health is already undermined by the bad condition of her teeth and digestion, becomes ever weaker, ever more anemic as pregnancy advances, for the development of the new being necessarily implies a continual subtraction of plastic elements from the maternal blood; and while this fluid, in a healthy woman, continually compensates such losses by an abundant absorption of nutrient substances, in the case of a woman who fails to masticate properly and whose digestion is impaired the blood cannot sufficiently repair the losses sustained, and becomes progressively impoverished.

Unfortunately, the number of these women is very great, and the children to whom they give birth are, of necessity, congenitally weak. But, further, from the first days after birth the congenital weakness is augmented by a new and potent cause of debility, represented by the poor quality of the maternal milk. In fact, it is evident that the milk of weak, anemic women must necessarily be poor in nutritive elements, without taking into account that in many of these women the lacteal secretion is scarce or is altogether absent, so that the mother is obliged—except in the case of wealthy persons who can afford a wet-nurse—to have recourse to artificial feeding, which is well known to be detrimental to the child's health. It therefore happens in a great number of cases that infants whose congenital weakness may be traced to the dental maladies of their parents are, besides, badly nourished during the very first period of life, becoming in consequence weaker and weaker, and therefore always more liable to fall a prey to tuberculous infection.

DENTAL MALADIES IN RELATION TO THE CHILD'S DEVELOPMENT.

We must now turn our attention to the great frequency of dental maladies in childhood and to the bad effects resulting therefrom to the physical development of children. It is today well known that a high percentage—seventy-five per cent. or more—of school children have carious teeth. Now, if dental maladies have extremely harmful consequences in adults, they exercise a still more pernicious influence on the physical development of children, and therefore on the resistance of the child's organism to pathogenic influences.

Exact and systematic researches made in many schools as to the relations between height, body weight, and the state of the teeth, have resulted in the clearest proof that among children of the same age and sex the advantage in physical development is most decidedly with those whose dental apparatus is the better, and that, on the other hand, that development is much poorer in those whose teeth are in a bad condition.

It therefore results with mathematical certainty from these researches that a bad condition of the teeth in children seriously affects the general physical development. And as poor development is a sure indication of constitutional weakness, we necessarily come to the conclusion that dental maladies in children—considering their enormous frequency and the gravity which they assume in a large percentage of cases—are a cause of organic weakness in an immense number of young persons—a weakness that naturally creates predisposition to tuberculosis.

The above considerations clearly show that dental maladies may bring about tuberculosis in many different ways—above all, by creating in various ways conditions of debility, sometimes congenital, sometimes acquired, and often at the same time both congenital and acquired. Besides this, the want of cleanliness of the mouth, together with dental maladies, may also become in a direct way the cause of tuberculosis, by favoring the multiplication of the tubercle bacillus, which because it exists everywhere easily gets into the mouth, and at the same time by creating solutions of continuity in the dental and peridental tissues which render possible the penetration of the said bacillus into the lymphatic channels; while on the other hand, when the tubercle bacilli in the mouth and throat have become very numerous by reason of the diseased or anti-hygienic conditions of the oral cavity, their direct penetration into the air-passages is rendered very easy, either with the air breathed in, or with particles of saliva or other substances that penetrate casually into the larynx and bronchial tubes.

DEBILITY THROUGH POVERTY A SOURCE OF TUBERCULOSIS.

Another most important fact should here engage our attention. We have seen that dental maladies give rise, in different ways, to an immense number of cases of general weakness, congenital or acquired. Now, no one ignores the fact that weak individuals are very subject to sickness, and it is equally well known that weakness and illness are great sources of poverty. This, in its turn, must be considered as one of the most important etiological factors of tuberculosis, for poverty and indigence mean scant nourishment and inferior conditions of life, often with small, cold, damp, uncleanly rooms without light and air—all of which things injure the organism in a high degree, and may very easily lead to tuberculosis. We must therefore add to the many other methods in which dental maladies can become the cause of this terrible disease the conditions of poverty and anti-hygienic living, resulting in innumerable cases from weakened physical conditions, unhealthiness, incapacity for work, due directly or indirectly to maladies of the dental system.

CONCLUSIONS.

I think I have shown clearly enough the enormous significance of bad dental conditions in the general etiology of tuberculosis. This being established, the natural conclusion is, that in combating this terrible disease a leading place should be assigned to the means and to the institutions having for their aim the prevention and treatment of dental maladies.

If tuberculosis be a scourge of humanity, diseases of the teeth, with their enormous frequency and with the numerous deleterious consequences derived from them, are an equally terrible scourge; they, in fact, predispose the organism not alone to tuberculous infection, but to infections and maladies of every kind. If, therefore, it be necessary to combat tuberculosis with the utmost energy, no less energy is required in combating dental maladies. We have, so to speak, to deal with two enemies at one time, allied in working for the detriment of humanity, nor can we deal efficaciously with the one unless we also fight the other.

Besides, it should be observed that hygiene of the mouth and the treatment of dental maladies in the struggle against tuberculosis not only represent preventive means, but are also a curative factor of the highest order. In the therapeutics of tuberculous affections, one of the indications, perhaps the most important of all, is to improve nutrition. To attain this end, it is not sufficient—although at the same time absolutely necessary—that patients should feed adequately and breathe pure air. It is equally necessary, and perhaps even more indispensable, that they should masticate and digest their food perfectly, and that auto-intoxications of dental origin should be entirely avoided.

Therefore, in all cases of tuberculosis, dental maladies should be promptly attended to, the constant practice of oral hygiene should be strenuously inculcated in the patients, and added to all this, the loss of natural teeth should, when considered necessary for obtaining perfect mastication, be supplied by means of dental prosthesis.

I said a little while ago that it cannot be hoped to combat tuberculosis successfully without undertaking at the same time an active crusade against dental maladies. I will not here enter into a discussion as to the means by which this should be effected, as it would lead me too far. I will merely say that the masses of the people ought to be enlightened in all possible ways as to the extraordinary importance of oral hygiene and how to practice it. This educational propaganda should be carried on in schools, in the army, in industrial laboratories, among the general public, everywhere and by every possible means—pamphlets, lectures, scholastic mural illustrations, daily papers, periodicals, and so on. But it is not sufficient to *teach* oral hygiene, it is also necessary to provide for the prompt and accurate treatment of dental maladies in the greatest number of individuals possible, beginning with infancy. The necessity is therefore obvious of adequate dental services for school children, for educational institutions generally, for the workers in town and country, for the hospital sick, for prisoners, etc., while special provision should be made for military and naval forces. The aim toward which we should tend is to secure efficient and prompt treatment of dental maladies in all ages, classes, and conditions of citizens; and when the sufferers are not able to pay, gratuitous aid should be forthcoming.

CORRESPONDENCE.

"A REPLY" WHICH IS NOT A REPLY TO MY DISCUSSION OF DR. CASE'S PAPER.

To the Editor of the Dental Cosmos:

Sir,—In the September issue of the Cosmos is an article by Dr. Case which is supposed to be a reply to my discussion of the paper which he read before the National Dental Association in 1911, at Cleveland. I realize that it will be a useless task to try to convert Dr. Case to my views, but there are questions brought up in this discussion which involve more than the mere personal views of Dr. Case or myself. It is these things to which I desire to call attention.

One type of case which Dr. Case spoke about in his paper is what he terms "bimaxillary protrusion." In discussing his paper I made the remark that I had never seen a case of bimaxillary protrusion, which to me seemed a joke. I still hold that view. I claim that bimaxillary protrusion only exists for those who have not mastered the principles of treatment as we understand them, are not following the plan of treatment that has been laid down, and are therefore forced to resort to extraction in cases where it is not really necessary—is, in fact, contraindicated. I have never seen a case of so-called bimaxillary protrusion which could not be treated without extraction and give better results from the standpoint of efficiency and facial outline than if four teeth were extracted as Dr. Case advocated.

Admitting that Dr. Case and I practice in different localities, and that there might be more cases of bimaxillary protrusion in Chicago than in Kansas City, the fact remains that there are other men practicing in Chicago, yet do not find the same number of cases demanding extraction that Dr. Case does.

Of course it will be impossible to convince some people that we are treating without extraction and getting good results in the same cases that are treated by some with extraction and with results that we would be ashamed of. At Cleveland, Dr. H. C. Ferris showed lantern slides of a number of cases which to me appeared to be the same as those Dr. Case showed and called bimaxillary protrusion. Dr. Case claimed they were not the same, and he refused to outline his treatment of the case before Dr. Ferris told the society how he had treated the case. Dr. Case would not state whether he would or would not extract, therefore it is impossible for us to show a case treated without extraction which would be the same as Dr. Case would treat by extraction. Consequently, the case as it now stands is that while we are willing to outline our plan of treatment for any case at any time, Dr. Case refused to commit himself except on those cases in which he has extracted teeth, thereby making it impossible for us ever to treat one of his cases as it should be and show the advantage of non-extraction over extraction.

At the Cleveland meeting Dr. Case showed a model, to which I referred in my discussion, stating that the teeth were not in normal occlusion—which statement I am ready to prove at any time. Dr. Case would have it believed that I did not know it was a corrected case and not one of original bimaxillary protrusion. I did not say that the model was one of bimaxillary protrusion, only that the teeth were not in normal occlusion, and that for two reasons. There had been four teeth extracted and all of the remaining molars and premolars were in lingual occlusion. The arches had not been properly expanded. I observed that in the attempt to reduce the protrusion of the anterior teeth the operator had pulled the upper and lower molars and premolars forward, which movement as much as any other had closed the space made by the needless sacrifice of the premolars. Dr. Case referred to the result as "a perfect masticating interdigitation of buccal and lingual cusps," which is a different thing from normal occlusion of the inclined planes of the teeth. Also, teeth are not always in normal occlusion when you have a normal mesio-distal relation of the arch, as some would have you think. You may have a normal mesiodistal relation of the molars, you may have a proper locking of the inclined planes of each individual molar, yet all of the teeth occupying positions of malocclusion.

I made the statement at Cleveland that it was impossible for the child to inherit the mandible of one parent and the maxilla of the other. Dr. Case did not answer that question at Cleveland, and does not answer it in the September Cosmos. I again ask the question, "How can the child inherit the mandible of one parent and the maxilla of the other?" Until Dr. Case or some of his biological friends tell us how such a condition can occur, we shall have to accept the large amount of anatomical and embryological evidences which show such conditions as Dr. Case describes to be impossible.

Dr. Case is very much alarmed over the statement of Dr. F. B. Noyes that bone develops as a result of mechanical stimulation. Again he quotes from my paper, and his quotation contains a plain question which he did not answer at Cleveland and has again failed to answer in your September issue; I hope he will answer it soon. It is, "If bone does not develop as a result of mechanical stimulation, how does it develop?" Dr. Case has not, nor have any of his biological friends, given us the least explanation of the development of bone that would prove Dr. Noyes to be incorrect in his statement, and until they do we shall have to accept the great amount of evidence which shows that bone develops from mechanical stimulation. Experiments on animals, clinical evidence, models and photographs, all show that mandibles are being made to grow, nasal cavities are made to increase in size—in fact, all of the bones of the face develop and grow as a result of mechanical stimulation properly applied. In the next year much more evidence will be brought to bear upon the subject of bone development, and further facts will be shown to prove the correctness of Dr. Noyes' statement. In the meantime we have a right to expect that Dr. Case and his friends will answer the direct questions that I asked at Cleveland and have asked again here—which questions have twice been overlooked by Dr. Case.

Yours truly,

Martin Dewey, D.D.S., M.D.

Kansas City, Mo.

DENTAL CLINICS OF THE CHILDREN'S AID SOCIETY OF NEW YORK CITY.

To the Editor of the Dental Cosmos:

Sir,—In a paper read before the Seventh and Eighth District Dental Societies in November 1911, and published in the Dental Cosmos for July 1912, Dr. H. L. Wheeler makes the following statement:

"The work established by the Children's Aid Society, which has been discussed so much, has also had its ups and downs, and at the present time I am informed that although that society has three different institutions with a dental equipment, only one is in operation, and to this only one practitioner is attached, who serves gratuitously."

In the month preceding the reading of this paper the following report of the dental clinics of the Children's Aid Society was published by the society in their annual report, and could be had by anyone for the asking:

Teeth filled	1392
Number of visits to clinics	2176
Roots of non-vital teeth treated and filled	94
Teeth devitalized and filled	20
Teeth extracted (temporary)	667
Teeth extracted (permanent)	64
Gas administrations	8
Abscesses lanced and treated	28
Other treatments given	1274
Children whose teeth were cleansed	413
Total operations	3960
Visits made by dentists	323

The facts in this matter are as follows:

These clinics, which were organized in 1907, were never doing better work or more of it than at the time this criticism was lodged against them. Instead of there being only one clinic in operation with one man in attendance, as Dr. Wheeler states, both were regularly open and over a dozen volunteer dentists were giving their services to the work.

Unfortunately, these clinics have from the beginning been dependent upon volunteer service, which has never been and can never be the success which one might wish, but it can be said without fear of contradiction that there are no dental clinics in this city dependent upon such service which have been the success that the dental clinics of the Children's Aid Society have been.

The men in attendance at these clinics have been most unselfish in their services, often in the face of criticism and misrepresentation from those from whom they had a right to expect the most sympathetic co-operation.

Yours truly,
ARTHUR H. MERRITT.

NEW YORK CITY, October 15, 1912.

OXYPHOSPHATE CEMENT AS A ROOT-FILLING.

TO THE EDITOR OF THE DENTAL COSMOS:

Sir,—We read every month in our dental magazines concerning various methods of root-filling using materials of all kinds from vaselin and eucapercha and gutta-percha points to gold foil. Does it not ever occur to the men who regard these materials as essential to success, that in every case where any of the centrals or canines are replaced by a porcelain crown, using a post in the root, that an oxyphosphate cement never gives any trouble. Those who use gutta-percha do so because they claim it to be preferable in case removal is necessary, not because they fear trouble from the cements.

In a practice of nearly thirty years I have tried, I think, nearly all the materials for filling the roots of bicuspids and molars, from silk and cotton saturated with eucalyptol to oxychlorid and eucapercha. For years I used only an oxyphosphate cement mixed thin, and on looking over my records of those years I believe I had less trouble than with anything else. Using all the care possible, I believe we have plenty of complaints of soreness and pain with any root-filling; why, then, is not an oxyphosphate cement a good root-filling?

Yours truly,
H. F. GLEASON, M.D.

MALDEN, MASS.

PROCEEDINGS OF SOCIETIES.

NATIONAL DENTAL ASSOCIATION.

Sixteenth Annual Meeting, held at Washington, D. C., September 10 to 13, 1912.

GENERAL SESSIONS.

(Continued from page 1268.)

THURSDAY—*Third Session.*

The general session was called to order by the president, Dr. A. R. Melendy, Knoxville, Tenn., on Thursday at 12 o'clock noon, September 12, 1912.

The first order of business was the report of the Executive Council, viz:

Dr. H. J. BURKHART. A request has come from the members of the International Dental Federation with reference to the invitation to that association to hold its meeting in this country next year. They request that this association carry forward that invitation—that is, that they be invited to meet in this country in 1915 at the time of the Panama Pacific Dental Congress. If there is no objection, the secretary will be directed to so notify the officers of the International Dental Federation.

The Council also reports a resolution for your approval to the effect that the present delegates to the International Dental Federation, or rather the Sixth International Dental Congress, which convenes in London in 1914, be empowered to make all necessary arrangements with reference to securing papers and the transaction of any business that may be necessary with reference to the dental profession in this country, and to take charge of the interests of the National Dental Association for that congress.

The report of the Committee on Revision of the Constitution has been referred by the Council under the rules to this body, and will come up for consideration at 1.30 this afternoon.

The Council approves of the resolution which has been offered with reference to the Chapin A. Harris Memorial Fund. This fund is for the purpose of providing for a monument to be erected in honor of Dr. Harris in Baltimore, and all members of the profession are requested to contribute as liberally as possible to that fund.

The following resolution has been considered by the Council, and referred back to this body for adoption. [See November COSMOS, page 1260.]

I move the adoption of the report. [Motion carried.]

The next order of business, as announced in the daily program, was the reading of a paper by L. F. KEBLER, M.D., Washington, D. C., entitled "Preparations for the Toilet of the Mouth and Teeth."

[This paper is printed in full at page 1328 of the present issue of the COSMOS.]

Dr. M. F. FINLEY. I move you, Mr. President, that we extend to Dr. Kebler a rising vote of thanks for his valuable and interesting communication to our association. [Motion carried.]

Dr. BURKHART. I have the pleasure of introducing to you a distinguished member of the dental profession of Europe and the treasurer of the International Dental Federation, Dr. Florestan Aguilar of Madrid, Spain.

Dr. AGUILAR spoke as follows:

Mr. President, ladies and gentlemen,—I shall not encroach upon your precious time, but I wish to thank you for the courteous invitation extended to me. It gives me great pleasure to come as the official representative of the International Dental Federation to answer the kind invitation from your association to have our next meeting in the United States. We have requested that the invitation be carried forward, and we shall be most pleased to join with you in 1915 in San Francisco, Cal. [Applause.]

I have also the most pleasant task of delivering to Professor Black of Chicago the W. D. Miller medal, which has been awarded to him by the International Dental Federation. [Applause.]

It must be a source of pride to you gentlemen and to the members of the American dental profession at large to see that one of your colleagues has been honored with this medal, which comes from the dental profession of all the nations of the world as a token of admiration of the work done by that member of the American dental profession.

I have also been empowered with the diplomatic charge of inviting you to come to London to the International Dental Congress which will be held there in 1914. We hope that America, always foremost in work for the advancement of dentistry of the world, will not fail to be represented there in large numbers, and with a large contribution to the literary work of the congress. [Applause.]

ELECTION OF OFFICERS.

The next order of business was the election of officers and the selection of the time and place of the next meeting.

Dr. H. V. BROCKETT, Kansas City, presented an invitation to the association to meet in Kansas City in 1913.

Dr. B. HOLLY SMITH moved that the rules be suspended, and that the secretary be instructed to cast one ballot of the association for Kansas City as the place of meeting for 1913. [Motion carried.]

Dr. MCMILLAN moved that the time be set for the first Tuesday after the fourth of July. [Motion carried.]

The election of officers for the ensuing year resulted as follows:

President—F. O. Hetrick, Ottawa, Kans.

Vice-president for the West—T. B. Hartzell, Minneapolis, Minn.

Vice-president for the East—V. H. Jackson, New York, N. Y.

Vice-president for the South—J. H. London, Washington, D. C.

Corresponding Secretary—C. W. Rodgers, Boston, Mass.

Recording Secretary—H. C. Brown, Columbus, Ohio.

Treasurer—H. B. McFadden, Philadelphia, Pa.

Executive Committee—C. M. Work, V. H. Jackson, and W. G. Mason.

Executive Council—H. J. Burkhart, Charles McManus, T. P. Hinman, B. Holly Smith, and E. R. Warner.

REPORT OF COMMITTEE ON PRESIDENT'S ADDRESS.

Dr. JAS. TRUMAN, chairman, then presented the report of the Committee on the President's Address, as follows:

The committee to whom was referred the President's address has given it careful consideration.

The recommendation in regard to the raising of a fund to aid aged dentists has our entire sympathy, and we would suggest that the committee selected by the president devise a method by which the state associations can be brought in harmony with the subject.

The suggestion that a committee be appointed consisting of three members, whose duty it shall be to present to the proper parties the just claims of our profession to a proportion of the benefactions of the world, meets with our warmest approval, but it does not seem feasible or desirable at this time. The existence of the Forsyth Dental Infirmary is a more eloquent appeal to those who are able to contribute to the amelioration of human suffering than the efforts of any committee. Much can be done by making known the generosity of the Forsyth brothers.

Your committee recognizes the value of the results of the scientific work being done by the government, reports of all of which are obtainable through its various bureaus, but does not think it wise to undertake a work, through this association, that the government is able to do in a much more efficient manner.

The act of Congress of August 22, 1912, giving rank and precedence to the dental corps in the same manner in all respects as in the case of appointees in the medical corps of the navy, is of such importance that it merits special notice, for, by this act, the government of the United States has set its stamp upon the character of dental work and its important relations to the healing art.

To the self-sacrificing character of Dr. Wms. Donnally's work, through fourteen years of unceasing effort, is due this success, and your committee heartily indorses all that the president said upon this subject.

The suggestion that the association should render the Legislative Committee such financial assistance in the prosecution of their work as may be required, meets with our cordial approbation, and we hope that this may be arranged as requested by the president.

James Truman, *Chairman*,
Frank L. Platt,
Henry W. Morgan, *Committee*.

Dr. Melendy. If there is no objection, we will consider that this report is adopted.

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*Dr. Jas. Truman, Philadelphia. Mr. President and gentlemen, I have something of my own in a personal way which I wish to lay before this body, and as I have the consent of the Executive Council to do this, I presume that there will be no objection.

I do not know that everyone feels as I feel in respect to the passage of the bill before Congress in respect to the navy, but any of you having passed through sixty-odd years of service in the dental profession, and having reached the eighty-sixth year of age, will appreciate what it means, and I feel it incumbent upon me to rejoice that at last we are being recognized as equal to the medical profession, in our own lines of work, by the government of the United States of America. [Applause.] And when I read this fact in the bill that I hold in my hand, that was passed, in which it states that "All appointees authorized by this act shall take rank and precedence in the same manner and in all respects as in the case of appointees to the medical corps of the navy," etc., I rejoice at what has been accomplished.

Now, gentlemen, in 1906 the then president of this body appointed a committee to investigate certain charges being urged against Dr. Williams Donnally of Washington. I was made chairman of that committee, and we organized in Philadelphia on June 30, 1906, with all the formalities, all the rights, etc., necessary in the investigation of such charges, with a lawyer from Washington representing Dr. Donnally, and another from New York representing the other side, and carried the work to completion. I do not propose to go into the history of that occasion, but I do want to say something in regard to Dr. Donnally's work.

I do not think that this profession throughout the United States comprehends what that man has done for its elevation through fourteen years of sacrifice. I say, I do not think they understand it. I therefore want my views to go out through this report to the farthest extent of this country.

During that investigation, with Dr. Donnally before the committee, Mr. White, a lawyer from New York, when Dr. Donnally had described the difficulties he had contended with, and the wrongs he had suffered, asked Dr. Donnally the following question: "How have they wronged you?"—alluding to the previous testimony. Dr. Donnally replied as follows:

Dr. Donnally. [This is a quotation from the stenographic record made at the time.] They have wronged me in this, if you want to know exactly: I care for no individual wrong—that has nothing to do with the case at all. I could treat my bitterest enemy with justice, but as a man who for and in behalf of the profession's interest in the army and navy service—I have given my time and money and the best part of my life to this cause; deprived my family of many a comfort and many a pleasure, and created a debt on my insurance policies, and left my home covered with a mortgage. I was making such sacrifices as that for the profession, and I had a right to expect that these men would carry out the purposes that the profession had in view.

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* These remarks are published, in connection with the resolutions following them, at the request of Dr. Truman, and are not made a part of the official report, pending the action of the Committee on History, to which they were referred by Council for final disposition. —Ed.

The Chairman. Can you give an approximation of the expenses you have incurred in this work? . . . .

Dr. Donnally. Over five thousand dollars, without hope of reward.

Now, when the Assistant Surgeon-general of the navy spoke to Dr. Donnally about influential friends recommending him for an honorable position in the dental service of the navy, Dr. Donnally made the following reply—and if there is a man in our profession who has more honorably stood out for its best interests through all these fourteen years, if there is another man who has made more sacrifices, all home comforts, all the comforts of life, everything that makes life worth living, than has Dr. Donnally, then I do not know that man—and after all these sacrifices, when the simple suggestion was made, this was his answer:

August 24, 1912.

Assist. Surgeon-general Richards,
Navy Department.

My dear Sir,—Please permit me to assure you that I have not authorized nor do I expect under any circumstances to authorize anyone to make any recommendation or representation to the Surgeon-general in my personal interest. Indeed, sir, I have no purely personal interest the bureau of Medicine and Surgery could serve. While the recent navy dental legislation is the result of activities of the National Dental Association, I and all dentists with whom I have been associated base the object of our effort on the recognized dental needs of the navy *personnel*, on our conception of the economic and humane duty of the government, and on our sense of the rights and obligations of the beneficent profession of dentistry; and I therefore do not hesitate to say that the dental profession in general, and more particularly that large and representative portion whose cooperative effort has been characterized by a self-sacrificing loyalty to this worthy cause, would regard the exploitation of any personal object in connection therewith as not only strangely indelicate and suspiciously sinister in purpose, but at this peculiarly inopportune and critical time a positive reflection on the true attitude of the profession and a serious menace to the profession's rightful opportunity in the premise. Since you must recognize the National Dental Association as officered and equipped to render the assistance you request and require in connection with the navy dental service, perhaps I should merely tender the good offices of this association without reference to the attitude and sentiment of the self-respecting members of the profession.

Trusting the act of Congress may serve its full measure of usefulness until improved by amendment, I have the honor to remain,

Faithfully yours,
Wms. Donnally.

Now, I want to say just here that I hold no brief for Dr. Wms. Donnally, but I do hold a brief for truth, justice, and the honor of our profession, that may be in danger of dethronement at the footsteps of the altar of a great sacrifice.

Mr. President, I wish to offer the following preamble and resolutions for the consideration of this association:

Whereas, the report of the Army and Navy Legislation Committee having been presented, and the satisfactory results fully outlined therein, it is deemed appropriate that this should receive special notice from this National body responsible for this work from the beginning; and

Whereas, this report marks an era in dentistry, inasmuch as it shows that the government of the United States has placed its stamp of recognition on our profession, regarding it as a recognized branch of the healing art, and as a specialty equal in its achievements to that of other specialties of medicine; therefore be it

Resolved, That in view of the fact that dentistry has been given a place in both army and navy, through the efforts of this and previous committees, that this, the National Dental Association, representing the entire United States, tender to these its grateful thanks and appreciation of their labor and its results; and be it

Resolved, That it is recognized by this body that the success attending this prolonged effort, through fourteen years, is mainly due to Dr. Wms. Donnally of Washington, and this has been fully recognized by this committee and past committees in charge of this responsible duty; therefore be it

Resolved, That inasmuch as this has not been accomplished except through large money outlay and sacrifice of time, resulting in serious loss and some financial embarrassment, in the past, to Dr. Wms. Donnally, the Executive Council be requested to take this into consideration and devise a plan to reimburse the said Dr. Wms. Donnally for the lavish sacrifice of his private means, and that the said council report the result of its conclusions to a future sitting of this body during its present session.

Dr. Truman. Mr. Chairman, I move the adoption of the resolutions as read. [Motion carried.]

Report of the Revision Committee.

The next order of business was the report of the Revision Committee, viz:

CONSTITUTION AND BY-LAWS OF THE NATIONAL DENTAL ASSOCIATION.

[*Unanimously adopted.*]

Article I—*Name.*

The name of this organization shall be The National Dental Association.

Article II—*Object.*

The object of this association shall be to promote the art and science of dentistry. To achieve this the association shall endeavor to unite the dental profession of the United States into one compact body, thus creating a power the units of which, working with a harmony of purpose, will foster fraternal relations and intercourse among dentists; safeguard the material interests of the profession; elevate the standards and improve the methods of dental education; secure the enactment and enforcement of just dental laws, while aiming at a unification of state dental statutes, and enlighten and direct public opinion in relation to oral hygiene, dental prophylaxis, and advanced scientific dental service.

Article III—*Membership.*

The membership of this association shall consist of the present members, and such members of the constituent societies, and such members of the army dental corps, and of the navy dental corps, and such others as shall be elected in accordance with the By-laws, as hereinafter provided.

Article IV—*Constituent Societies.*

Section 1. State and territorial societies which have, or which hereafter may, become organized in conformity with the general plan of the National Dental Association, and which have declared their allegiance to said National Dental Association, and which shall agree to the formation and perpetuation of the house of Delegates, shall be recognized as constituent societies.

Sec. 2. The term "state society" shall be understood to mean the representative dental organization of any one of the states which have been received into the Union, and whose active membership is restricted to legal practitioners practicing within the legal borders of such state. The term "territorial society" shall apply in similar manner to the representative dental organization of any of the territorial possessions of the United States. Provided, however, that the term "territorial society" shall be held to include the societies of the District of Columbia, of the Canal zone, and of the insular possessions of the United States.

Article V—*The House of Delegates.*

Section 1. There shall be a business body known as the house of Delegates of the National Dental Association. It shall consist of delegates elected by the constituent societies, and by the other dental bodies named in Section 2 of this article. The house of Delegates shall represent the delegated powers of the members of the National Dental Association, and shall be the national representative body of the constitutent societies. It shall elect the general officers of the association and a board of nine trustees, and shall transact all the business of the association, public, professional, or scientific, not otherwise provided for. The trustees shall be members of the house of Delegates, without the right to vote.

Sec. 2. The total voting membership in the house of Delegates (exclusive of the Board of Trustees) shall be as follows: One delegate shall be allowed from each scientific section, from the army dental corps, from the navy dental corps, and one from each constituent society. Each constituent society shall be entitled to one additional delegate if one hundred of its members become regularly enrolled as members of the National Dental Association; and one more delegate for each additional two hundred members enrolled.

Explanatory.—Regardless of enrollment in the National Dental Association each constituent society would have 1 delegate;—

100	members	in the	National,	2	delegates.
300	“	“ “	“	3	“
500	“	“ “	“	4	“
700	“	“ “	“	5	“
900	“	“ “	“	6	“
1100	“	“ “	“	7	“
1300	“	“ “	“	8	“
1500	“	“ “	“	9	“

In case any states do not affiliate, all members of the National Dental Association residing in such states may meet together at the first meeting of any session of this association, and elect one delegate to represent them in the house of Delegates.

ARTICLE VI—*Sections.*

SECTION 1. This association shall be divided into three sections, as follows:

Section I shall have charge of operative dentistry, nomenclature, literature, dental education, and allied subjects.

Section II shall have charge of oral surgery, anatomy, physiology, histology, pathology, etiology, prophylaxis, oral hygiene, materia medica, and allied subjects.

Section III shall have charge of prosthodontia, orthodontia, metallurgy, chemistry, and allied subjects.

SEC. 2. New sections may be created, or existing sections discontinued or modified, by the house of Delegates.

ARTICLE VII—*Branches.*

In addition to the existing Southern Branch, the house of Delegates may create such branch organizations as may be deemed essential to the welfare of the National Dental Association and of the dental profession.

ARTICLE VIII—*Annual Sessions.*

The National Dental Association shall hold an annual session at the time and place chosen by the house of Delegates. The time and place for the session, however, may be changed by the unanimous vote of the Board of Trustees, but not later than sixty days prior to the time selected for the session.

ARTICLE IX—*Officers.*

SECTION 1. The general officers of the association shall be a president, three vice-presidents, a general secretary, and a treasurer.

SEC. 2. These officers shall be elected annually by the house of Delegates, to serve for one year, or until their successors shall have been elected and installed.

SEC. 3. No member of the house of Delegates shall be eligible to the office of president or vice-president.

ARTICLE X—*Board of Trustees.*

SECTION 1. The Board of Trustees shall have charge of the property and of the financial affairs of the association.

SEC. 2. Three trustees shall be elected annually by the house of Delegates, each to serve for a period of three years.

SEC. 3. No voting member of the house of Delegates shall be eligible to election on the Board of Trustees, but the Board of Trustees after election shall be members of the house of Delegates, without the right to vote.

SEC. 4. No member who has served one full term as a member of the Board of Trustees, shall be eligible for re-election on the board until a period of three years has elapsed, provided that this does not apply to *ex officio* members of the board.

(*Resolved,* That the present Council shall be members of the first Board of Trustees, and shall serve out their present terms, and they shall also be eligible for re-election for one full term of three years.)

ARTICLE XI—*Dues and Assessments.*

SECTION 1. The annual dues in this association shall be one dollar.

SEC. 2. Members of the army and navy dental corps may be elected to full membership, with all privileges, on payment of the annual dues.

SEC. 3. All members of the National Dental Association in good standing shall receive the Journal free. To members of state dental societies not enrolled in the National Dental Association the subscription to the Journal shall be two dollars; and to all others the subscription shall be three dollars; provided that if this should be in conflict with the rules of the United States postal authorities the Board of Trustees may reduce the general subscription to two dollars.

SEC. 4. In case of need, in order to raise funds, the house of Delegates may order an assessment not to exceed two dollars in one year, for each member; or an assessment not to exceed fifty dollars in one year upon each constituent society, but not both.

ARTICLE XII—*Amendments.*

The house of Delegates may amend or alter this Constitution at any annual session, due notice having been given at a previous meeting of said annual session, provided unanimous consent may be obtained. Otherwise all amendments must lie on the table until the annual session next following their introduction, at which time a two-thirds vote will be requisite for their adoption. In the latter procedure due notice of the substance, or if not too lengthy the exact wording, of the proposed changes must be sent to each member of the house of Delegates with the regular notice of the annual session.

By-laws.

BOOK I: MEMBERSHIP.

CHAPTER I—*Qualification for Active Membership.*

SECTION 1. A member in good standing of a constituent society shall be eligible for membership in the National Dental Association on presentation to the general secretary of the following: (1) Satisfactory evidence; (2) written application for membership on the prescribed form; (3) the annual dues.

SEC. 2. Members of the army and navy dental corps may become members in like manner, upon presenting satisfactory evidence of membership in said corps.

SEC. 3. Members must retain their membership in constituent societies. Upon official notification from a constituent society that a member has lost this qualification, the general secretary will erase the delinquent's name from the roll of membership of this association, and notify him of this action, stating the reason therefor.

SEC. 4. Any member who has forfeited his membership in accordance with Section 3 shall be reinstated on his request by the general secretary, on presentation of satisfactory evidence that his qualification has been restored by the constituent society.

SEC. 5. Any member who shall fail to pay his annual dues for one year, unless absent from the country, shall be dropped from the roll of members, provided that due notice shall be previously given to the member by the general secretary. Any member who has been suspended for non-payment of dues shall be restored only when all his dues have been paid.

SEC. 6. A member who becomes a resident of another state to retain his membership in the National Dental Association must become a member of the constituent society in the state to which he has removed.

CHAPTER II—*Registration.*

SECTION 1. No member shall take part in the proceedings of the association or of any of the sections until he has registered his name and address with the proper officer or committee and has paid his annual dues for the current year.

SEC. 2. A member desiring to take part in the scientific work of the association shall indicate, when registering, the section in which he wishes to be enrolled.

CHAPTER III—*Delegated Members, Honorary Members, Associate Members, etc.*

SECTION 1. Members delegated to the house of Delegates shall register and pay their annual dues, thus qualifying as members of this association, before taking their seats in the house of Delegates.

SEC. 2. Dentists who have risen to pre-eminence in foreign countries shall be eligible to honorary membership. They may be elected by the house of Delegates on nomination by a section, but not more than three honorary members shall be elected in any one year.

SEC. 3. Associate membership may be granted by the house of Delegates to distinguished visitors. Such membership accords all privileges for one year, including the Journal of the association.

SEC. 4. Membership of all classes may be declared forfeited by the house of Delegates for reasons considered sufficient by that body.

BOOK II: DELEGATES.

CHAPTER IV—*Qualifications, Terms, Apportionment and Registration of Delegates and Alternates.*

SECTION 1. No one shall serve as a member of the house of Delegates who is not a member of this association.

SEC. 2. Delegates and alternates from the scientific sections and from the army and navy dental corps shall be elected for one year. Delegates and alternates from constituent societies shall be elected for two years. Constituent societies entitled to more than one delegate shall elect them so that one-half, as near as may be, shall be elected each year.

SEC. 3. Beginning with the annual session of 1913, the house of Delegates shall be constituted as described in Article V of Section 2 of the Constitution. The number of delegates to which each constituent society may be entitled shall be based on the number of members from whom dues for the current year shall have been received by the general secretary of this association at least thirty days prior to the first day of the annual session of this association.

Sec. 4. In the cases of those constituent societies which do not hold meetings of the current year at least forty-five days prior to the annual session of this association the number of delegates shall be estimated on the dues for the previous year received by the general secretary of this association.

Sec. 5. To be represented in the house of Delegates the officers of each constituent society shall file with the general secretary of this association, at least thirty days prior to the first day of the annual session, a list of the names of its delegates and alternates.

Sec. 6. Previous to the annual session the general secretary of this association shall prepare and have printed a list of the delegates and alternates elected by the various constituent societies; also the number of paid members of each. In case any society has elected more delegates than the number to which its paid membership shows it to be entitled, the general secretary in preparing the list shall drop one or more names from the list of such society, beginning at the bottom of the list, until the proper number of names remain.

Sec. 7. At any election of delegates, the body electing may at the same time elect as many alternates as delegates, and the alternate of each delegate may sit in his stead in the house of Delegates in the absence of the regular delegate from any annual session, except as provided in Section 9 of this chapter.

Sec. 8. Every delegate must present his credentials and be duly registered by the general secretary, or other designated officer or committee, before taking part in the business of the house of Delegates. Credentials shall include a certificate duly signed by the proper officials of the body delegating him, and such other evidence as may be required.

Sec. 9. The credentials of a delegate having been accepted and his name placed on the roll of the house of Delegates, he shall remain the duly accredited delegate of the body which he represents until final adjournment of the session, and his place shall not be taken by any other delegate or alternate.

Chapter V—*Procedure of House of Delegates.*

Section 1—*Order of business.* The following shall be the order of business unless changed by unanimous consent:

1. Call to order by the president.
2. Roll-call.
3. Reading and adoption of minutes.
4. Reports of officers.
5. Reports of committees.
6. Unfinished business.
7. New business.

Sec. 2. No new business shall be introduced into the house of Delegates on the last day of the annual session unless with unanimous consent; and such new business, whether in the form of a resolution, memorial or otherwise, shall require a unanimous vote for final action.

Sec. 3. The house of Delegates shall be governed by Roberts' Rules of Order, when not in conflict with these By-laws or with the rules of the house.

Sec. 4. One-fifth of the voting members of the nouse of Delegates shall constitute a quorum.

Chapter VI—*Meetings of the House of Delegates.*

Section 1. The house of Delegates shall meet annually on the day preceding the opening of, and at the same place as, the annual session of the association.

Sec. 2. Special sessions of the house of Delegates shall be called by the president, on written request of a sufficient number of delegates to represent a majority of the constituent societies, by mailing a written or printed notice to the last known address of each delegate, at least twenty days before such special session is to be held, in which shall be specified the time and place of meeting and in general terms the objects of such special session, and no other business shall be transacted thereat. The time and place for the meeting of a special session must be given in the requests signed by the delegates.

Chapter VII—*Nomination, Election, and Installation of Officers, Trustees, Honorary Members, Associate Members, etc.*

Section 1. Nominations for office, except that of treasurer, shall be made orally, but no nominating speech shall exceed two minutes in length. Any nominee receiving the majority of the votes cast shall be declared elected. The treasurer shall be nominated by the Board of Trustees, who shall present two names.

Sec. 2. All elections shall be by ballot, and a majority of the votes cast shall be necessary to elect. In case no nominee receives a majority of the votes on the first ballot the nominee receiving the least number of votes shall be dropped, and a new ballot held. This procedure shall be continued until one of the nominees receives a majority of all votes cast, when he shall be declared elected.

SEC. 3. The election of officers shall be the first order of business of the house of Delegates after the reading of the minutes on the afternoon of the third day of the annual session.

SEC. 4. Nominations for honorary membership from the sections shall be referred without debate to the Committee on Sections and Section Work, which shall consider the relative scientific attainments and professional character of the nominees, and shall report its conclusions to the house of Delegates for action. The election of honorary members shall immediately follow the election of officers.

SEC. 5. Nominations for associate membership may be made by the sections at any meeting of the house of Delegates, and may be confirmed, with or without reference to the Committee on Sections and Section Work, at the will of the majority of the house of Delegates.

SEC. 6. The general officers of the association shall be installed at the close of the last meeting of the annual session at which they are elected.

BOOK III.

CHAPTER VIII—*Officers, Trustees, and Committees.*

SECTION 1—*President.* The president shall preside at the general meeting and at the meetings of the house of Delegates, and shall perform such duties as custom and parliamentary usage require. On the morning of the first day of the annual session following his election he shall deliver an address at the general meeting not exceeding forty minutes in length.

SEC. 2 — *Vice-presidents.* The vice-presidents shall assist the president. During his absence or at his request one of them shall officiate in his place. In case of the death, resignation, or removal of the president, the vacancy shall be filled by the ranking vice-president.

SEC. 3—*General secretary.* The general secretary shall give due notice of the time and place of all annual and special sessions of the association and of the house of Delegates, by publishing the same in the Journal of the National Dental Association and other journals. He shall notify members of committees of their appointment, and of the duties assigned to them. It shall be his duty to verify the credentials of members of the house of Delegates and to provide a registration book for them, in which shall be recorded the name of each delegate in attendance at each session. He shall collect all dues and transmit the same to the treasurer, as may be directed by the Board of Trustees, and as receipt for dues shall issue certificates of membership. He shall conduct all correspondence required of him by the association or by the house of Delegates, or which may become necessary in the rightful conduct of his office. He shall keep in separate books the minutes of the general meetings and of the house of Delegates. He shall prepare a roll of the delegates attending each session to facilitate voting by roll-call. He shall prepare for publication the official program of each session, and shall perform such other duties as may be directed by the association or by the house of Delegates, and shall receive a salary to be fixed by the Board of Trustees.

SEC. 4—*Treasurer.* The treasurer shall be the custodian of all moneys, securities and deeds belonging to the association, and shall hold the same, subject to the direction of the Board of Trustees. He shall give to the Board of Trustees a suitable bond, and shall receive a salary to be fixed by the Board of Trustees.

CHAPTER IX—*Board of Trustees.*

SECTION 1. The Board of Trustees shall have charge of all properties and of the financial affairs of the association. At the first meeting of the board after the annual session of the association it shall organize. In addition to the nine elected members of the Board of Trustees, the president and general secretary shall be *ex officio* members and shall hold the same positions in the board as in the association, but the board shall elect a recording secretary, who shall keep its records and make its reports.

SEC. 2—*Journal.* It shall be the duty of the Board of Trustees to provide for and superintend the publication of the Journal of the National Dental Association, and of all proceedings, transactions, and memoirs of the association. It shall have full discretionary power to omit from the Journal of the National Dental Association, in part or in whole, any paper that may be referred to it by any of the sections. It shall appoint a general manager and editor of the Journal, which two positions may be held by one person, and such assistants as may be necessary, and shall determine the terms and conditions of their employment.

SEC. 3—*Meetings during annual sessions.* During the annual session of the association the board shall hold meetings as often as may be deemed necessary by the president, and all matters referred to it by the house of Delegates shall be reported on within twenty-four hours, if so ordered by the house.

SEC. 4—*Board reports.* The Board of Trustees shall have the accounts of the treasurer and of the Journal office audited annually, or oftener if deemed necessary, and shall make an annual report on the same to the house of Delegates, which report shall also specify the character and cost of all the publications of the association during the year and the amount of all property belonging to the association.

SEC. 5—*Vacancies.* In case of vacancy in the office of treasurer, or board secretary, the vacancy shall be filled by the Board of Trustees.

SEC. 6—*Salaries.* The Board of Trustees shall fix the salaries of the general secretary, the treasurer, the board secretary, and of the Journal manager and the editor.

SEC. 7—*Regular meetings of board.* Regular meetings of the Board of Trustees shall be held immediately after the annual session of the association and at the same place, and on the first Monday in the month of February, of each year, at such place as the board may select at its first meeting.

SEC. 8—*Special meetings of board.* Special meetings of the Board of Trustees may be called at any time by the president, or by request of five members of the board, due notice of which must be given to each member of the board at least five days in advance of the meeting. The general object of a special meeting must be stated in the notice, and no other business may be transacted.

SEC. 9—*Annual sessions, exhibits, clinics, and general arrangements.* The Board of Trustees shall have full control of all arrangements for the annual sessions, and shall provide meeting-places for the association, the house of Delegates and the various sections. It shall also have control of all clinics and of all exhibits. The Board of Trustees in their discretion may appoint a local committee of arrangements, which shall at all times be under the control of the Board of Trustees.

CHAPTER X—*Committees.*

SECTION 1. Committees shall be classified as (a) standing committees, (b) reference committees, (c) special committees. These committees shall be nominated by the president and elected by the house of Delegates, unless otherwise provided.

SEC. 2—*Committees, appointment and powers.* Reference committees shall be nominated from among the house of Delegates, but any member of the association shall be eligible to serve on standing or special committees. All members of committees who are not members of the house of Delegates shall have the right to present their reports in person to the house of Delegates, and to participate in the debate thereon, but shall not have the right to vote.

SEC. 3—*Standing committees.* Standing committees shall be as follows:

(a) A Judicial Council.
(b) A Committee on Dental Education.
(c) A Committee on Dental Legislation.
(d) A Committee on Transportation and Place of Session.

SEC. 4—*Judicial Council.* The Judicial Council shall be composed of five members, to be appointed by the president on the first day of each annual session from the delegates present, and to continue in office until their successors are appointed. It shall organize by electing a chairman and a secretary. The latter shall keep a permanent record of its proceedings, shall conduct all correspondence, etc. The Judicial Council shall hold such meetings during the annual session, and during the year, as it may deem necessary. Three members shall constitute a quorum. It shall make an annual report of its proceedings to the house of Delegates. To this council shall be referred all questions, complaints, protests, and matters of an ethical nature. When such complaints, protests, etc., concern an individual's relations with his local or state society, they shall be considered by this council only after the same shall have been referred to the constituent society concerned, or on an appeal from such constituent society. Its decisions shall be subject to appeal to the house of Delegates.

SEC. 5—*Committee on Dental Education.* The Committee on Dental Education shall consist of five members. One member shall be elected to serve one year, one for two years, one for three years, one for four years, and one for five years. Thereafter one member shall be elected each year to serve five years. The committee shall organize, shall elect a chairman and secretary, and shall adopt such regulations for the government of its actions as it may deem expedient. It shall expend money or contract financial obligations only as shall be authorized in writing by the Board of Trustees. The functions of the Committee on Dental Education shall be: (1) To make an annual report to the house of Delegates on the existing conditions of dental education in the United States. (2) To make suggestions as to the means and methods by which the National Dental Association may best influence favorably dental education. (3) To act as the agent of the National Dental Association under instructions of the house of Delegates, in its efforts to elevate the standards of dental education.

SEC. 6—*Committee on Dental Legislation.* The Committee on Dental Legislation shall consist of five members. One member shall be elected for one year, one for two years, one for three years, one for four years, and one for five years. Thereafter one member shall be elected each year to serve for five years. The committee shall organize, shall elect a chairman and secretary, and shall adopt such regulations for the government of its actions as it may deem expedient. It shall expend money or contract financial obligations only as shall be authorized in writing by the Board of Trustees. This committee shall have the authority to appoint a subcommittee, consisting of one member from each constituent society, and shall have the power to co-operate with the officers of the state and local societies, and with the chief officers of the United States army and navy in regard to legislation affecting the welfare of dentistry. The Committee on Dental Legislation shall report to the house of Delegates at each annual session its proceedings during the previous year, and shall recommend such action in respect to pending legislation as it shall deem proper.

SEC. 7—*Committee on Transportation and Place of Sessions.* The Committee on Transportation and Place of Sessions shall consist of five members. The chairman shall be elected to serve for three years; the other four members shall be appointed by the president annually, one of whom shall reside in the place chosen for the next annual session. Invitation for the association to convene in any city or place shall be presented to this committee, whose duty it shall be to recommend to the house of Delegates the places available for an annual session, with advantages and disadvantages of each. The committee shall secure railroad rates for the annual session, and shall publish same in the Journal of the National Dental Association, and other journals, at the earliest possible time prior to the date of the annual session.

SEC. 8—*Reports of standing committees.* The reports of standing committees shall, as far as possible, be transmitted to the general secretary ten days before the date of the annual session, and he shall have them printed for distribution to members of the house of Delegates at the first meeting of the annual session.

SEC. 9—*Reference committees.* (a) Immediately after the organization of the house of Delegates, at each annual session, the president shall appoint from among its members such committees as may be deemed expedient by the house of Delegates. Each committee shall consist of three members unless otherwise provided, the chairman to be specified by the president. The members of these committees shall serve during the session at which they are appointed.

(b) To the appropriate committee shall be referred resolutions, measures, and propositions presented to the house of Delegates before final action shall be taken, unless otherwise unanimously ordered by the house of Delegates.

(c) Each reference committee shall, as soon as possible after the adjournment of each meeting, or during the meeting, if necessary, take up and consider such business as may have been referred to it, and shall report on the same at the next meeting, or when called on to do so.

(d) The following reference committees are hereby provided:

1. A Committee on Sections and Section Work, to which shall be referred all business relating to the sections.
2. A Committee on Rules and Order of Business, to which shall be referred all matters regarding rules governing the action, methods of procedure and order of business of the house of Delegates.
3. A Committee on Dental Education, to which shall be referred all matters relating to dental colleges and dental education. The members of the standing Committee on Dental Education shall be *ex officio* members of this reference committee.
4. A Committee on Legislation, to which shall be referred all matters relating to state and national legislation. The members of the standing Committee on Dental Legislation shall be *ex officio* members of this reference committee.
5. A Committee on Amendments to the Constitution and By-laws, to which shall be referred all business relating to this subject.
6. A Committee on Reports of Officers, to which shall be referred the president's address and the secretary's and trustees' reports.
7. A Committee on Credentials, to which shall be referred all questions regarding the registration and the credentials of delegates.
8. A Committee on Miscellaneous Business, to which shall be referred all business not otherwise disposed of.

BOOK IV.

CHAPTER XI—*General Meetings.*

SECTION 1—*Time of general meetings.* The general meetings shall be held at 10.30 A.M. and at 8 P.M. of the first day of the annual session, and at 8 P.M. of the subsequent days.

SEC. 2—*Addresses.* At the first general meeting shall be delivered the address of the president, whose recommendations shall thereupon go to the house of Delegates for action. The balance of the time of the first meeting shall be devoted to such other addresses as may be provided. The first evening meeting shall be devoted to a paper recommended by Section I, the second evening meeting to a paper recommended by Section II, and the third evening meeting to a paper recommended by Section III.

SEC. 3—*Order of business.* The order of the first general meeting shall be as follows:

1. Calling the meeting to order.
2. Prayer.
3. Address of welcome and response.
4. Report of Committee of Arrangements.
5. President's annual address.
6. Discussion of president's address.
7. Literary program.
8. Adjournment.

CHAPTER XII—*Sections.*

SECTION 1—*Meetings.* Each section shall hold its first meeting at 2 P.M. of the first day of the annual session, and on each subsequent day at 9 A.M., until the program is completed or as the section may decide; provided that a section shall hold no meeting that will conflict with a general meeting.

SEC. 2—*Officers of sections.* The officers of each section shall consist of a chairman, vice-chairman, and a secretary. These shall serve for one year, or until their successors are elected and qualify; provided that each section may elect its secretary to serve a longer time at its discretion. Each section shall also elect annually one representative and an alternate to the house of Delegates of the National Dental Association, to serve for one year.

SEC. 3—*Election of officers.* The election of officers of each section shall be the first order of business of the morning meeting of the last day of each annual session.

SEC. 4—*Duties of section officers.* (a) Each chairman shall perform the usual duties of such office, and shall co-operate with the section secretary, in procuring papers and in the arrangement of the program for his section. (b) Each vice-chairman shall assist his chairman, and take his place when necessary. (c) Each secretary shall keep the records of the section in a book provided for such purpose; shall, with the co-operation of the chairman, conduct all correspondence necessary to secure papers and perfect the program for his section; and he shall forward to the general secretary, at least forty days prior to the date of the annual session, a copy of his section program for insertion in the official program, and shall perform all other duties pertaining to the office of secretary.

SEC. 5—*Executive Committee.* Each section shall have an Executive Committee, which shall consist of the last three retired chairmen. In the absence of a member of this committee the acting chairman shall sit in his stead. At the first organization of each section, in 1913, an Executive Committee of three shall be elected, one to serve for one year, one for two years, and one for three years, by which time the Executive Committee will be constituted as above provided. The Executive Committee shall examine and pass on all papers read before the section, and shall indorse for publication only those that are of scientific or of practical value; it shall also examine all papers offered to the section prior to the reading thereof, and shall choose the one to be read before the general meeting devoted to the work of its particular section, and such paper shall not be read before the section meeting.

SEC. 6—*Honorary and Associate members.* Each section, at its opening meeting, may make nominations for honorary and for associate members, in accordance with Sections 2 and 3 of Chapter III. The secretary shall immediately notify the general secretary of such nominations.

CHAPTER XIII—*Papers and Discussions.*

SECTION 1. Titles and abstracts of papers offered to sections must be in the hands of the section secretary at least forty-five days prior to the annual session.

SEC. 2. The time allowed for the presentation of a paper before a section shall be limited to thirty minutes, except by unanimous consent. No one shall address a section more than once on the same subject, nor for longer than five minutes, except with the consent of the majority of those present.

SEC. 3. Each section may provide by-laws for its own government, provided these by-laws do not conflict with the Constitution and By-laws of the association.

CHAPTER XIV—*Publication.*

SECTION 1. No paper shall be published as having been read before a section unless it has received the approval of the Executive Committee of said section.

SEC. 2. Each author shall hand his manuscript to the section secretary immediately after the reading thereof, and such manuscript must be ready for publication at that time, and must be accompanied by copy for all illustrations needed. The secretary shall indorse thereon that it has been read, and shall hand it to the Executive Committee for its action. All papers approved by the Executive Committee shall be returned to the section secretary, who shall at once forward them for publication to the editor of the Journal.

SEC. 3. No paper shall be published as having been read before a section unless it has actually been read, or unless, for special reasons, when the author has been present and prepared to read the paper, the section shall vote to have it read by title.

SEC. 4. All papers and reports presented to a section, and approved by the Executive Committee, shall become the exclusive property of the association, provided that the Board of Trustees may permit an author to publish his paper elsewhere than in the Journal of the National Dental Association.

SEC. 5—*Official resolutions approved by the house of Delegates.* No memorial, resolution, or opinion of any character whatever shall be issued in the name of the National Dental Association, unless it shall have been approved by the house of Delegates.

BOOK V—AMENDMENTS.

CHAPTER XV—*Articles of Incorporation.*

SECTION 1. The house of Delegates at any annual session, wherever the same may be held, may instruct the Board of Trustees to make any changes in the articles of incorporation in accordance with the law, which may appear desirable, or which may be made necessary by any change or amendment to the Constitution and By-laws of this association.

SEC. 2. These By-laws may be amended on a two-thirds vote of the house of Delegates, provided that no amendment shall be acted on till the day following that on which it is introduced; except that the Board of Trustees may by unanimous vote make such changes, and such changes only, as may be required to adapt them to the rules and regulations of the United States postal authorities.

DR. J. D. PATTERSON. I move that the report of the Revision Committee as coming from the Council be adopted. [Motion carried.]

The Report of the Committee on Scientific Research was then read by Dr. HENRY C. FERRIS, New York, N. Y., as follows:

REPORT OF THE COMMITTEE ON SCIENTIFIC RESEARCH.

I wish to state that the work of this committee has been greatly hampered by unavoidable circumstances, due first to misunderstandings between the editor of the DENTAL COSMOS and your chairman in reference to the publication of the charts of last year's report, published in the November 1911 issue of that magazine, and the delay of the publication of the association's Transactions.

LAST YEAR'S REPORT.

It is not a simple matter to introduce a new technique in physiological or biological work, and while the members of my committee, representing nine universities of the country, are willing and anxious to carry out the undertaking, it must be remembered that it is a side issue to their daily procedure, without remuneration, and that they have been unable to carry through the problems presented to them to a point where definite conclusions can be drawn at this time; and while this statement is disappointing on first consideration, we may congratulate ourselves that we have been able to interest the universities in this effort.

In our report of 1911, we started a research, employing a given technique, to improve our information upon the normal physiological action of saliva upon foods, and noted the effects of stimulation through the function of mastication, with and without the sense of taste, upon some of the physiological properties of this secretion. We also attempted to determine the effects of certain chemicals used in mouth-washes upon these physiological properties.

This work was but a beginning, which was to serve as an illustration of the vast amount of information needed before we can come to any definite diagnostic conclusions that will assist us in the treatment of the maladies to which our special domain of the human body is subject. The greatest value can be attained through the careful tabulation of findings of a number of scientific workers operating under a uniform method of procedure, and it is toward this end that your chairman has been working for the last five years. When we compare our last year's report with the thousands of examinations made of the urinary excreta before any definite conclusions were drawn, we may be encouraged.

SCOPE OF THE WORK.

The object of this undertaking is to improve our information, so that we may more intelligently study the etiology of the pathological processes of the oral cavity. There is no short road to procure the information we seek, viz, the Causes of Caries in the tooth structure, and of Pyorrhea Alveolaris, the two most prevalent diseases of mankind; and in consequence of the difficulties presented, we beg your indulgence.

In this year's effort, each investigator was requested to examine with our technique ten specimens of as nearly normal mouths as could be found, showing normal urinary analysis within physiological limits, where the acidity had been titrated.

The problems presented to the different universities were as follows, and were to constitute a budget report over the signature of each experimenter:

H. Carlton Smith, representing Harvard University, Dental Department: To develop a technique for the quantitative analysis of carbon dioxid (CO_2).

Russell W. Bunting, representing Michigan University, Dental Department: Bacteriological research as directed toward the subject of caries.

Frederick B. Noyes, representing Northwestern University Dental School: Acid index and the viscosity.

W. H. G. Logan, representing Chicago College of Dental Surgery: Acidity and enzymic index.

E. Hoffmeister, representing Baltimore College of Dental Surgery: Relation of enzymic index and urea.

A. W. Lee, representing California University, Dental Department: Physiological research.

J. B. Stein, representing New York College of Dentistry: Blood pressure and viscosity.

Friedrich Hecker, representing Kansas City Dental College: Method to determine bacteriological index of oral cavity.

H. M. Semans, representing Starling-Ohio Medical College, Dental Department: Relation in caries between potassium and sodium base.

Report on Quantitative Analysis of Carbon Dioxid.

H. Carlton Smith:

Dear Doctor,—In making my report to you in reference to a method of determining a quantitative value of CO_2 in saliva, would state that I have done quite a little work on a method of determining the acidity due to CO_2, and inclose cut of apparatus which I have used.

I have found by means of this apparatus that the carbonic acid content of the saliva differs with the method of collection, and that the acid reaction to phenol-phthalein is in the majority of cases temporary, and due wholly to CO_2. Many salivas, however, show a permanent acidity after removing all CO_2, and it is the relation of such samples to disease conditions of the teeth that interest me particularly.

The air is drawn from left to right, first through a potash bulb to absorb atmospheric CO_2, next through 10 cc. of saliva diluted with 20 cc. of water contained in a small Soxhlet flask, whereby the CO_2 from the saliva is carried through the "test-tube condenser" and collected in baryta water in the Erlenmeyer flask at the left. This in turn is connected with a suction pump or aspirator. The "drip cup" has been found necessary when working with very viscid samples. The "thistle tube" holds water for maintaining the volume in the Soxhlet flask, if the condenser is not used.

The amount of free CO_2 may be determined by adding a standard carbonate solution (N/100 Na_2CO_3) to a volume of baryta water equal to that used in the Erlenmeyer flask, and then comparing the degree of turbidity obtained. This may be done by viewing through flat-bottom tubes (shell tubes) of about 20 cc. capacity, or, in many cases, better, by use of the Duboscq colorimeter used for determination of ammonia.

I am working with a viscosimeter, but have not attained results which would be of value to you as yet.

I trust that this work will continue, as I believe it to be of great scientific value.

This method presented by Prof. H. Carlton Smith directs us into an entirely new line of thought, and is bound to modify our technique and control our conclusions as to acid content.

We are now analyzing for free and combined acids, there being a marked difference in these readings, but by this method we learn that an immediate examination of a specimen for acidity should be taken, or our present method, as far as free acids are concerned, will be valueless. And it will furnish a method of quantitative value of carbon dioxid, and cause us to investigate the physicochemical reasons for its production. We shall await with interest Dr. Smith's report on this subject.

Report on Method to Determine Bacteriological Index of Oral Cavity.

Dr. Friedrich Hecker:

Dear Doctor,—Answering the inquiry of the letter received recently, I will say that after a period of ten years of study of the bacterial flora of the mouth, I find that at this time I am able to isolate and grow eighteen different varieties of micro-organisms. Of this number, the majority have been found in the mouths of patients suffering with pyorrhea.

I have, however, grown a great many organisms in normal mouths. Many of these organisms morphologically, microscopically, and also culturally, correspond to the same types found in the mouths of patients suffering with pyorrhea. Hence I believe it is fair to say that the bacterial flora of the mouth, especially in normal mouths, differs little from that in diseased mouths, the only difference being that those mouths in which the disease is found have a lowered immunity, and as a result of this lowered immunity, the organisms find an excellent field for growth.

This being the case, one can readily understand why a certain type of organism is found in greatest predominence in diseased processes of the mouth.

I believe it is safe to say that I can isolate and grow in the normal mouth at least from ten to fifteen organisms, any one of which is capable of producing disease processes. A detailed description consisting of morphology, cultural characteristics, and a staining reaction would require a great deal of hard work for a considerable period of time. However, if you desire such information, I will try to furnish you from my notes such data.

Personally, I have been pursuing some work on leucocytes. I find that in cases of pyorrhea the condition is characterized by the following blood-picture:

	Per cent.
Neutrophilic polymorphonuclears	46
Large lymphocytes	40 to 60
Small lymphocytes	3 " 5

Eosinophiles, transitionals, degenerates, basket cells, and irritations making up the balance.

Basis on a percentage of 100 cells counted.

I can with considerable accuracy now make a diagnosis of pyorrhea on this leucocyte count. Accompanying this process there is always found an intestinal toxemia, and as soon as this condition has been corrected, a marked result is noted in the mouth. The gums, as a rule, do not bleed as readily, the tongue is no longer coated, and the foul breath of toxemia is no more in evidence. This work, while it does not apply directly to dentistry, is of interest because of the physiological process noted.

Hoping that this brief account of work will interest someone to carry it further, and that the brief description of the blood-picture will be of service to some future investigator, I believe this is about all the work that I can at this time report.

Report on Bacteriological Research into Dental Caries.

Dr. Russell W. Bunting:

My dear Doctor,—My report as to the work that I have been doing is as follows: I spent practically all my time in the investigation of the relative rate of fermentation in a large number of mouths. From this work I have a large amount of statistics, which are very interesting indeed, but not definite enough to justify me in drawing any hard-and-fast conclusions as yet. I therefore cannot make a report upon my work, as it is not complete, but I hope to take it up another year and obtain some definite knowledge of some of the phases of the problem, at least.

The work in the bacteriological field, being ably represented by these gentlemen, is shaping toward definite conclusions.

The report of Dr. F. Hecker, with his technique, will contain many points of advanced information from which we can draw conclusions, as it bears upon the biological action of the physiological properties of the secretion, and causes us to investigate those conditions which interfere with a normal quantity of the ferment oxydase, which to a large degree controls the immunity of the organ.

It is to be hoped that they will be able to produce for us a simple method of determining the bacteriological index by a method similar to those used in determining the index in the feces.

DIAGNOSIS AND TREATMENT BASED ON SALIVARY ANALYSIS.

Your chairman in his report wishes to submit the history of a case from practice, in which the diagnosis and treatment has been governed by information gained bv salivary analysis, thereby proving its practical value.

Case. Dr. D. S. Gardner of Scranton, Pa., who was suffering from hyperchlorhydria, presented himself for treatment, introduced by Dr. C. C. Laubach of the same city. The history of his case was as follows: He had a malocclusion of his teeth, and presented fifty-three inclined planes in occlusion, which reduced the masticating ability of his organ sixty-one per cent., as compared with the one hundred and thirty-four inclined planes in normal occlusion.

The continual regurgitation of acid into his throat and mouth became so acute that he had to give up his practice of dentistry and put himself in the hands of a pathologist, who put him upon a starvation diet until he had lost thirty pounds. This treatment in no way relieved his condition. His only relief was to chew gum, thereby increasing the flow of saliva.

He changed his medical adviser, and was put upon five meals a day, eating as much as he could at each meal. The medication recommended was unimportant. In a period of a few weeks, he gained thirty-five pounds, but still his acid condition existed. Your essayist made an examination of his saliva and urine. Since a high percentage of free acids and an excessive amount of chlorin, with a urine normal excepting for a small increase in the percentage of indican was found, sodium chlorid in all forms was eliminated from his diet. As a result of this examination he was then recommended to masticate each mouthful of food fifty times, and drink five glasses of water daily between meals.

Examinations of his specimens were then made every two weeks, and the increase in the elimination of acids in the urine, the gradual decrease of the acids and chlorin in the saliva and the variation in sulfo-ammonia, were notable. At the end of three months he became normal, and his trouble disappeared.* The correction of his malocclusion and prosthetic restoration were recommended to restore his masticatory organ to its normal ability. If this were not done, the prediction was made that he would suffer from some other intestinal lesion.

The recommendation not being heeded, an attack of appendicitis occurred six months later, and an operation was performed. There may be an exception taken to this conclusion, but I relate this late experience as a matter of history. After this experience he had prosthetic restorations made, and has been in good health for the last two years, having resumed his practice.

**Summary of examinations.*

Date.	Sulfocyanate.	Aminoacids.	Chlorin.	Salivary acid index.	Urinary acid index.
May	1:14,000 or 0.00684	1: 7,000 or 0.0142	0.124	9.5	30
June	1:11,000 “ 0.00909	1:11,000 “ 0.00909	0.081	4.5	40
July	1:16,800 “ 0.00595	1: 7,200 “ 0.0138	0.094	8.5	44
August	1:11,000 “ 0.00909	1: 7,000 “ 0.0142	0.060	3.5	50
Sept. 7th	1: 9,000 “ 0.01111	1: 5,800 “ 0.01706	0.048	2.0	45
Sept. 20th	1:14,000 “ 0.00684	1:12,000 “ 0.00833	0.024	1.5	40

The technique utilized was one of the first recommended, and gave but little information for study, but was sufficient to cure this case. Exception cannot be taken to the scientific reasoning from a physiological standpoint, and the experiment can be duplicated upon almost any subject, as your essayist has proved.

Further experimental work is now being undertaken upon several cases, and promises to give more startling results than I am at this time able to report.

Your chairman believes this to be the first pathological case reported where salivary analysis was the basis of the diagnosis; where from hyperacidity the oral secretion was returned to its normal condition, with beneficial constitutional effects, without the use of medication. This we trust will stimulate your interest in a wider scope in the practice of dentistry, hoping that records of this character will soon be duplicated in a large number, so that our services as specialists in the healing art may be more thoroughly appreciated by the scientific world. While we do not want to enter the field of medicine, we should aspire to care for the pathological conditions of the oral cavity.

What I have tried to impart will no doubt be welcomed by the most practical minds, who will find in these physiological facts some explanation, even though it may be meager, of the pathological phenomena, and, who, by knowing the true state of affairs, will be led to more carefully restore each anatomical part of the tooth, and will appreciate that the thirty-two teeth collectively must be considered of more importance to the functioning ability of the human organism than has been generally appreciated.

I am convinced that it is by frequent interchange of opinion between the physiologist and the dentist that the common goal of physiological science and of dental art will be more quickly reached.

Respectfully submitted,
HENRY C. FERRIS, *Chairman.*

The general session then adjourned until Friday noon.

FRIDAY—*Fourth Session.*

The general session was called to order on Friday at 12 o'clock noon, by the president, Dr. Melendy.

The first order of business was the report of the Executive Council, by the chairman, Dr. Burkhart, as follows:

Dr. BURKHART. I am directed by the Executive Council to offer the following resolution for adoption:

> RESOLVED, That at the 1913 session of the National Dental Association and on the third day thereof, the first house of Delegates shall convene for a single session for the election of officers, the appointment of committees, and such other business as may be necessary for placing the new constitution in operation, and the same members composing the house of Delegates shall serve as the house of Delegates at the session for 1914, and their terms of office shall begin thereat.

Motion was made and carried that the resolution be adopted.

The next order of business was the installation of the newly elected officers for the ensuing year.

Dr. BURKHART. I have been directed by the Council to offer a vote of thanks to the retiring president, Dr. Melendy, for his very earnest, efficient, and splendid service as president of this association.

Motion was made and carried that a vote of thanks be extended to Dr. Melendy for his efforts in making the present meeting a success.

Dr. BURKHART. I move that the secretary be directed to say to the proprietors of the Willard Hotel that never in its history has this association been so well and so satisfactorily cared for. They have done everything for the comfort and convenience of those in attendance at this convention, and they are entitled to a hearty vote of thanks for their efforts in our behalf. I also wish to include in the resolution a vote of thanks to the Local Committee of Arrangements in this city for their most efficient and hard work, and for the splendid arrangements which they have made for this meeting.

The motion was carried.

Dr. BURKHART. I also move that, in case of an emergency or any extraordinary event, the Executive Council be empowered to transact such business for the association as may be necessary, and that they be given power to change the time of the next meeting, if necessary. [Motion carried.]

Dr. BURKHART. I move that a hearty vote of thanks be also extended to the chairman and members of the Clinic Committee for their hard and efficient work in giving us one of the most successful clinics in the history of the association. [Motion carried.]

Motion was then made and carried that the association adjourn until the next annual meeting.

SECTION I: Prosthetic Dentistry, Crown and Bridge Work, Orthodontia, Metallurgy, Chemistry, and Allied Subjects.

Chairman—WESTON A. PRICE, Cleveland, Ohio.
Vice-chairman—HARRY E. KELSEY, Baltimore, Md.
Secretary—MARCUS L. WARD, Ann Arbor, Mich.

TUESDAY—*First Session.*

The first meeting of Section I was called to order on Tuesday afternoon, September 10th, at 2.30 o'clock, by the chairman, Dr. Weston A. Price, Cleveland, Ohio. The secretary, Dr. Ward, not being present, Dr. E. T. Loeffler, Ann Arbor, acted as secretary.

The first item on the program, as announced by the Chairman, was the reading of a paper by Dr. WILLIAM O. HULICK, Cincinnati, Ohio, entitled "Crown and Bridge Work," as follows:

CROWN AND BRIDGE WORK.

Three years ago, in Cincinnati, Dr. Green, an Episcopal minister, delivered a very interesting and highly instructive lecture entitled "The Gospel of Discontent." He made the statement that progress in all avenues is made by reason of the desire for something better; that we would retrograde were it not so. It was this discontent that gave us Edison's numerous inventions. Dr. Burbank, not satisfied with his wonderful success in plant life, succeeded in making food and drink out of the cactus, seemingly one of the most useless of plants, for the stock of the plains. He produced a pitless plum, and has worked hundreds of other miracles.

DISCONTENT THE STIMULUS TO PROGRESS.

The whole complex machine of commerce and industry—factory, farm, railroad, bank, office, government—has been built for production, construction, distribution, and protection. The present machine is the product of slow evolution, and the effort of the centuries to build a machine which will better cope with the problem has been the primary cause of our advance in the various activities of life. Integrity, honesty, sound health, fair dealing, respect for other's rights—these have come from the courageous assumption of one's burden of work, and the opposites of these are the results of the desire to dodge the burden.

The spirit of unrest, whether it be evidenced by the spontaneous and seemingly unaccountable strike of automatic workers, the questioning introspection of university faculties, the open defiance of law, or the cry for the doctor of industry, is the headache giving warning of deeper-seated organic trouble.

The worth of our education, our laws, our scientific management, will be determined by the extent to which they will make clear, conform with, and supplement the laws of work. Their test will lie in the degree to which they are useful in leading us safely forward to better, brighter conditions of work, and their basic idea must be service to the mass.

But what has this to do with dentistry, you will ask? The answer is, that many years ago our profession had and still has this discontent, and by reason of it has made most wonderful progress and success. We have had conscientious workers in our profession who have laid the foundations upon which we are building our houses today. Not being contented with the methods which were good in their time, we have improved them by working constantly, earnestly, and untiringly, thus performing a more perfect service for these bodies of ours.

THE MASTICATING APPARATUS.

Dr. Green referred to the wonderful machinery, the achievement of man, and how it is watched, cared for, and run by the most competent engineers our institutions of learning can produce, and how they will not overwork these machines beyond their capacity or requirement. He made comment on what has been done in the perfection of stock-breeding, making the astonishing but true statement that in the human body God has given us the most perfect and complete piece of mechanism yet known, and at the same time the most neglected. One of the most important parts of this mechanism is the teeth, and in the beginning the Creator intended them to do good service during the natural lifetime of the machine, biting off, grinding, and thoroughly preparing the fuel for this wonderful piece of machinery. They are arranged so that in the act of mastication they rotate and glide over each other without forcing their antagonists or themselves out of alignment. The service required of them in an ordinary meal is from 800 to 1200 closures or triturations of the mandible, while an extra large meal will require from 1500 to 3000 such movements. The crushing force in the act of mastication differs with occupation and environment; also certain foods require greater force than others. It is safe, however, to estimate this crushing force to be from fifty to one hundred and fifty pounds, and, under training, the muscles of mastication are capable of exerting a stress of nearly three hundred pounds on the first molars. We must conclude from these facts that it is necessary to have a complete arrangement to perform the natural function of mastication properly throughout the natural lifetime of the body as intended by the Creator. This brings us to another conclusion; that, with the loss of one or more of these natural organs, the general arrangement of the remaining teeth is changed, they become malposed and out of alignment. Occlusion, mastication, and assimilation become faulty, and many times the general health is impaired to a greater or lesser degree. It has been demonstrated beyond peradventure that the molars are necessary, and, when lost, must be replaced by artificial means. This gospel of discontent has played an important part in dentistry, and today we are not content with the methods of yesterday, yesterday we were not content with methods of one year before, and so on back for one hundred years.

PROGRESS IN DENTISTRY.

Were it not for this discontent, we would not be here assembled to exchange ideas for the betterment of the mechanical servitude, the esthetic effect, and the pathological disturbances caused by crown and bridge work. This discontent has worked wonders in all the branches of our profession, prosthetic, orthodontic, and operative. It gave us the Condit method of removable partial dentures, which has rendered good service, later the Roach and Gilmore, the Peeso, and many other methods of removable bridge work, the Mason detachable porcelain facings, and later the Steele, Goslee, and other facings. The most wonderful method of the age, the Taggart cast inlay, which has revolutionized operative and prosthetic dentistry, and Dr. Callahan's sulfuric acid treatment, which is being used successfully the world over, are also products of this spirit of unrest. It has taught us intensified prophylaxis and oral hygiene, which have brought more relief and comfort to humanity than perhaps any other treatment practiced by our profession at the present time.

SHORTCOMINGS IN CROWN AND BRIDGE WORK.

In view, however, of the scientific attainments and the untiring efforts of teachers, writers, and clinicians the world over, I believe in all sincerity that crown and bridge work is the most abused of any branch of our profession. Many operators, either owing to ignorance, lack of skill, or a purely commercial viewpoint, disregard the fundamental principles and mechanical laws, pathological conditions and practical uses, and the obligations imposed upon them. I believe more teeth are lost by faulty construction, misapplication of force, lack of knowledge, or a total disregard of the pathological, physiological, and mechanical principles and requirements than by any other cause. Oral sepsis is caused by pockets which collect food and invite decay; inflammation of the underlying tissues is caused by faulty construction, and teeth are loosened and prematurely lost by misapplication of force.

ORAL SEPSIS DUE TO FAULTY DENTAL OPERATIONS.

Dr. Wm. Hunter of London, England, has given us some shameful facts, when he says:

> No one has probably had more reason than I have had to admire the sheer ingenuity and mechanical skill constantly displayed by the dental surgeon. And no one has more reason to appreciate the ghastly tragedies of oral sepsis which misplaced ingenuity so often carries in its train. Gold fillings, gold caps, gold bridges, gold crowns, fixed dentures, built in, on, and around diseased teeth, form a veritable mausoleum of gold over a mass of sepsis to which there is no parallel in the whole realm of medicine or surgery. I speak from experience. The worst cases of anemia, gastritis, colitis of all kinds and degrees, of obscure fever of unknown origin, of purpura, of nervous disturbances of all kinds . . . owe their origin to, or are gravely complicated by, the oral sepsis produced by these gold traps of sepsis. Time and again I have traced the first onset of the whole trouble of which they complain to a period of within a month or two of their insertion. The sepsis hereby produced is particularly severe and hurtful in its effects. For it is dammed up in the bone and in the periosteum, and cannot be got rid of by any antiseptic measures which the patient or the doctor can carry out. Moreover, it is painless, and its septic effects therefore go on steadily accumulating in intensity without drawing attention to their seat of origin.
>
> The medical ill-effects of this septic surgery are to be seen every day in those who are the victims of this gilded dentistry—in their dirt-gray, sallow, pale, waxlike complexions, and in the chronic dyspepsias, intestinal disorders, ill-health, anemias, and nervous ("neurotic") complaints from which they suffer. The chief feature of this particular oral sepsis is that the whole of it is swallowed or absorbed in the lymphatics and blood. Unlike the sepsis of open wounds on the outside of the body, none of it is got rid of by free discharge on the surface. The effects of it, therefore, fall upon the whole of the alimentary tract from the tonsils downward.

I wish to quote Dr. Ottolengui, who writes as follows in defense of his dental colleagues:

> It is not the writer's intention to leave the impression that such evils as Dr. Hunter describes are representative of typical American dentistry. Quite to the contrary, no one better than he knows that perfectly scientific, thoroughly aseptic, and entirely sanitary dental operations are done by thousands of dentists in this country. Yet it is likewise true —and pity 'tis that 'tis true—that thousands of other dentists do exactly that sort of work which Dr. Hunter so aptly terms "septic dentistry."

DEFENSE OF CORRECTLY CONSTRUCTED CROWN AND BRIDGE WORK.

I do not wish to defend or denounce Dr. Hunter, for you know too well that these conditions do exist. On the other hand, I must rise in defense of my profession. I am here to stimulate you, one and all, to a better understanding of the fundamental principles underlying conservative aseptic dentistry. I am here to lead an insurgent movement—if you please, a progressive movement—signifying that we will do a better service today than our best efforts of yesterday were, and that we will help to educate the public in this movement for a higher-class service and a better knowledge of oral hygiene, pathology, and therapeutics, which will help prevent the deleterious conditions mentioned in the above quotation.

It is an obvious fact that these conditions are due to faulty construction and application of crown and bridge work, and are practiced upon the masses by incapable and irresponsible operators, who are criminals, literally speaking; frequently, on the other hand, a good service may have been rendered, and the neglect on the part of the patient be both appalling and criminal. I am positive that carelessness and ignorance and a disregard for cleanliness have caused failures and loss of supports and appliances which under favorable conditions would have given good service for many years. It is therefore a gross injustice to lay the blame for systemic conditions either on the operator or on the methods of replacement. I wish, also, to call attention to the undeniable fact that where no appliance is worn, unkept mouths with carious, broken-down teeth and abscessed roots which collect food particles and retain saliva to ferment and decay and be washed into the stomach, may and do cause the same systemic degeneration. Patients should therefore, be taught the uses and abuses of all appliances, the possible usefulness of crown and bridge work, the possibilities of a longer and greater service from extreme care and cleanliness, and the difference between good and bad crown and bridge work.

FAULTY CROWN AND BRIDGE WORK DENOUNCED.

In this connection I wish to add a word in defense of the public, in all kindness to my colleagues. The public is most unmercifully imposed upon at times, for it is not unreasonable to state that not over one-half of the patients applying for services can differentiate between good and bad crown and bridge work. Many times they get no service, and wonder why, although they have willingly paid the fee asked. In such cases, good teeth are often mutilated, a clean mouth is changed to an unclean one, and the patient would have been in a far better condition had no appliance been inserted. Therefore, to be progressive we should be capable of rendering such service as we would have rendered to ourselves under the same conditions. If we feel our inability to do this, would it not be better for us to devote our time and energy to the branch of work we are best fitted for? Would it not be better, even in a general practice, to recognize and acknowledge our inability to perform good service? Would it not be more commendable to send our clients to someone who is more capable of performing this special work, than to undertake it and fail? The failure perhaps would not mean so much to us, but would be irreparable to our clients. This course, to my mind, would not be to our discredit; on the contrary, I think our *clientèle* would thank and praise us for our honesty.

We must educate the public to the necessity of oral hygiene, its possibilities and probabilities, especially when an appliance is worn, from a single crown to full dentures. While the above quotations are undeniable facts, and are a sad awakening to some of the conditions that exist, I wish to bring before you the other side of the subject.

FACTORS IN THE CONSTRUCTION OF GOOD CROWN AND BRIDGE WORK.

Of all the products of the labor of the centuries, there are probably none to which we of this generation look with more satisfaction than to the scientific achievement and the mechanical ingenuity evidenced by thousands of our best dentists. Since the advent of the casting method—which simplifies the construction of many appliances and obviates many times the necessity of mutilating sound teeth; of replaceable facings, and many new methods of both fixed and removable bridge work; considering also the advanced education of the public in oral hygiene, therapeutics, pathological, and mechanical requirements, and the use and abuse of appliances, there seems no reasonable excuse for the deplorable conditions we see every day. The fundamental principles and requirements governing crown and bridge work are essentially the same as those governing the natural teeth, and should accordingly be heeded physiologically and mechanically. According to natural laws, the teeth were expected to do their own work and no more, for the time allotted to man; therefore, where there is undue pressure, unequal stress, overwork, or pathological disturbance, they will be lost in a surprisingly short time. It is reasonable, then, to admit that, when a tooth is lost and another one is engaged to supply its function, the service of the tooth so engaged is diminished. This being the case, and assuming that the teeth are essential parts of the human economy, it follows that when teeth are lost they must be replaced in the best possible way to give service for the greatest length of time; for at best, that economy is only a repaired one, and should be treated as such. It is my belief that crowns and bridges can be and are constructed in such a way that little or no inflammation is caused around the necks of the teeth or contiguous parts, and that the septic conditions can be reduced to a minimum in both fixed and removable bridge work. It is also my belief that we will become more and more conservative and scientific, and that crown and bridge substitutes will be used until the end of time. For esthetic and physiological reasons, when a single natural crown is lost, the root being in good condition, or when the root is lost, an appliance should be made at once to preserve the natural occlusion and arrangement of mastication. When teeth have been missing for some time, their arrangement will be changed, they will become malposed and out of occlusion, so that complete restoration to normal functions is impossible; also where there are no antagonists, they will become elongated and out of alignment. Since the efficiency of bridge work depends largely upon the superstructure, the teeth to be used as abutments should be well rooted and free from inflammation, the alveolus should be well absorbed in the spaces, and the gum tissue in a good healthy condition. Study models should be made with notations of all difficult cases, to determine the best possible method to adopt. After a careful study of these models, we should be ever mindful of the basic fundamental principles of mechanical and natural laws governing the pathological and physical conditions. As mentioned before, the closures in mastication will be from 800 to 2500 per meal, making an average of at least 3000 per day, or a grand total of more than 1,095,000 triturations at the year's end. Again, fifty pounds would be the fair average pressure required for roast beef, steak, or other meats used by most persons at least twice daily, requiring from forty to sixty triturations for each morsel or bite, before it is thoroughly masticated, a person consuming at least ten bites per meal.

UNREASONABLE DEMANDS MADE OF BRIDGE WORK.

It would seem from the foregoing facts that any bridge would be temporary in its service, especially if the appliance be large. If, however, the conditions are favorable and the mechanical laws have been complied with, the physical conditions will generally change in a degree to accommodate the situation. This being the case, the individual habits change, force of mastication or pounds of pressure become less and less involuntarily, and nature, providing somewhat for the unusual arrangement, will try to protect the teeth in the extra work imposed. It would be reasonable to conclude from these facts that, if we wish to comply with the physical and mechanical laws of mastication, no large fixed bridge should be inserted. Therefore it would seem unreasonable to expect four roots to support a fourteen-tooth bridge for any great length of time, inasmuch as they are only required to perform and to do their own work for the time allotted to man.

It is also unreasonable to expect the third molar and canine to support the four molars; the second molar and lateral to carry four intervening teeth; the first bicuspid and canine to carry posterior teeth without posterior support; a single molar or bicuspid to carry another molar dummy; a single anterior root to carry another dummy, or two canine roots to carry the four incisors and also the four bicuspids, as in a case that came to my notice. This undue pressure, unequal stress, and overwork will cause the abutment teeth to become loose and sore from periodontal involvement, and the length of time of the service is diminished materially.

INLAY AND OTHER ATTACHMENTS FOR BRIDGES.

Assuming that crowns and bridges or some form of prosthetic appliances are essential to health and appearances, they should be constructed in the most scientific, sanitary, and conservative way possible. All crowns should be counterparts of the natural ones in form and occlusion, contact points, and interdental spaces. All bridge work, whether fixed or removable, should carry out natural laws in articulation and occlusion, so as not to force themselves or their antagonists out of occlusion or alignment. Any large restoration should be of a removable nature, with a saddle on and over the alveolar ridge to receive and resist the impact, the supports serving to hold it in position. When teeth have been lost for some time, and no substitute has been employed, the remaining teeth will become malposed and out of alignment. In this case, in order to get a perfect adaptation at the necks of the supports, the bridge should be made in two parts with a separate post or some other form of attachment. A single molar carrying one dummy should have rest on the adjacent crown. A single anterior root carrying a dummy should have lingual rest on an adjacent tooth, to keep it from tipping over or rotating out of alignment and occlusion. These rests should be on inlays in teeth so employed. The inlay method of attachment for bridge work has many advantages, and has been employed successfully for many years in vital and devitalized teeth. The casting method has simplified this form of anchorage, and obviates the necessity of devitalizing and mutilating good sound teeth by grinding. Truly, in this age of progress, there seems no reasonable necessity for using a gold cap crown, or a porcelain tooth with a band, to cause irritation to the gum tissues surrounding the root, except when the natural crown is lost or so badly decayed and broken down as to require complete restoration.

THE DENTAL OUTLOOK.

This is a grand age for the practice of dentistry. Satisfactory results are obtained in many ways and by many methods. Result is the all-important point, and as we are our brother's keeper, we should at all times endeavor to use the latest appliances and methods.

Dr. Price made the statement some time ago that, next to his wife and family, whom he loved more than life itself, he loved his profession. Dr. Fletcher once made the statement in public that he would rather minister to the sick and suffering, working earnestly and honestly, and be able to cure, than be president of the United States. I thank God that we have with us at all times such men, in whose hands your children and mine, your friends and mine, are in safekeeping. So let us today make a new resolve to emulate such men, and, like them, be leaders. It was said by our late Dr. J. Taft: "We will pass this way but once, so let us make this good old world better for our having lived in it."

I like to think we are coming to a time when the great march forward to civilization will not largely be a matter of chance, with the blind often leading the blind, but more an organized, orderly movement in conformity with the laws of nature. In that day, the opportunist will not vault into the saddle of leadership when humanity, having been badly led, cries out for a leader; instead he will be a part of history with the medicine man of the savage, for at the bottom both of these, in their creation and in their haphazard panaceas, are the same. On the contrary, humanity will send out a well-trained, well-equipped vanguard of research men—physicists, bacteriologists, chemists, psychologists, biologists, economists, doctors, and dentists—to explore beyond the ranges of the known; it will send its historians back over the line of march to learn the lessons of past successes and failures; it will establish outposts where the facts uncovered will be formulated into laws; and from the outposts to the last mite of humanity will be an established way for the application of the law to the need.

Discussion.

Dr. H. B. Tileston, Louisville, Ky. Dr. Hulick has presented a thoughtful paper and one that may well cause us to pause; for his indictment of methods too frequently employed, even by those who ought to and do know better, is founded upon fact, and is justified.

There are those who, through indifference rather than ignorance or lack of skill, have frequently fallen far short of the application of scientific principles to the construction of crowns and bridges, even as you and I have done.

Dr. Hulick has asked me to direct my discussion to the hygienic and physiologic phases of crown and bridge work. So much has been said and written in the last few years concerning hygiene, and especially oral hygiene, that the public mind is much more fully awake to the importance of a clean mouth in its relation to the general health than it formerly was. Consequently much more is being demanded of the dentist by his patrons in the way of cleanliness, and they are disposed not only to scrutinize critically his person and his surroundings, but to be concerned also as to the hygienic possibilities of certain contrivances put into their mouths to supply lost teeth, and more particularly those fixed appliances known as bridge work.

I make the broad assertion, at the outset, that no piece of fixed bridge work is hygienic. I have never seen a fixed bridge that had been in use for any length of time that was not more or less unclean, hence unhygienic, depending upon the care given to it by the wearer, as well as upon its construction.

We hear much of so-called "self-cleansing spaces" in bridge work construction, and we know very well that there is no such thing. The larger the spaces provided to facilitate cleansing, the more they invite food impaction, and the more uncomfortable the bridge becomes to the wearer, albeit such spaces may, with diligence, be made fairly clean, but not of themselves.

A large number of bridge teeth supported by a few natural ones as abutments create a condition which is manifestly not physiological, and which grows worse as the number of teeth supported increase as compared with the number of teeth used to sustain them. Even extensive bridges with a minimum of supporting abutments may do well for awhile, but eventually pathological changes ensue, which in time will cause the loss of the supporting teeth.

These two propositions, viz, that bridge work is neither hygienic nor physiologic, are so self-evident that no argument is needed to support them.

The question, then, that interests us as practitioners in this particular art of supplying lost teeth is—Are the benefits to be derived from bridge work sufficient to overbalance the objections to it, and to justify the dentist in subjecting his patients to a certain amount of inconvenience and discomfort?

I think this question may be answered in the affirmative, providing always, of course, that the work is done in such a scientific manner as to reduce to a minimum the objections that are inseparable from it.

Prophylaxis as practiced by the up-to-date dentist of today will solve the hygienic problem. Bridges so constructed that the wearers may keep them nearly clean, may be, periodically at least, made perfectly sanitary by regular visits to the dentist for that purpose. No bridge should be fixed in position without the patient being impressed with the vital importance of caring for it in this way.

The time-honored custom which has prevailed since bridge work was first introduced, of making the dummies—referred to by some as supply teeth—without any lingual surface, leaving a cavernous space to facilitate cleaning operations, fails of its purpose, and is objectionable for several reasons. A better way, it seems to me, is to build the replacement teeth to full anatomical form, lingually as well as buccally, and have the bases rest firmly upon the gum over the ridge, giving a natural feel to the tongue, and permitting of cleansing just as the natural teeth are cleansed. Add to this proper occlusion and articulation, and bridge work becomes a thing of beauty, and a joy for quite a long time.

Removable bridges may not only be kept clean but can be sterilized; yet in spite of so manifest an advantage, many people prefer a fixed appliance, when conditions for such a construction are favorable, to a removable one. Cemented crowns and bridges appeal to most persons as being nearer akin to natural teeth, simply because they cannot be removed, and, after a time, the wearer becomes unconscious of their presence in the mouth. But when teeth are attached to a removable base, they are undeniably "false teeth," an idea extremely repulsive to many sensitive people, and the fact that they *must* be removed frequently for cleansing is a constant reminder that they are false teeth, and the wearer can never forget them.

Doubtless all have noted the sense of joyous relief that comes to one who has long worn a plate where a bridge was possible, when the bridge was finally cemented to place, and the old plate could be thrown away. And yet if, after the lapse of a year or so, this same individual could see that bridge as intimately as the dentist sees it, he would doubtless be willing to return to his plate with all the ignominy of wearing false teeth, and the necessity or the privilege of removing it and scrubbing it clean.

There is no good reason why single crowns on natural roots should not be so constructed as to be both hygienic and physiologic.

There has been considerable discussion as to the propriety of devitalizing all teeth to be used as abutments for bridge work. I am emphatically of the opinion that devitalization is not always necessary, but I do not think it is merely a matter of opinion, but one of expedience, and not subject to any arbitary rule. In the case of a molar to be prepared for a gold crown, much depends upon the original shape of the natural crown. If it is bell-shaped or leaning, requiring heroic cutting to prepare it, the comfort of the patient during the operation, as well as subsequently, demands that the pulp be removed. It is seldom necessary to devitalize a tooth for an inlay, either with or without pins.

As a general proposition I would condemn the use of teeth seriously affected by pyorrhea as end-supports for a bridge piece. An intermediate tooth, which has been treated but not restored to firmness, may be held immovable by the bridge and remain comfortable indefinitely, the bridge not depending upon it in any way for support.

Dr. Richard Morris, Evansville, Ill. In accepting Dr. Hulick's invitation to discuss his paper, I was not unmindful of the great responsibility which I assumed; neither was I unconscious of my inability to deal with it in such a way as such a scholarly effort deserves, but recalling with pleasure my association with Dr. Hulick, he being the teacher and I the student, I could not say No to his pressing invitation.

Whenever an operator becomes satisfied that he has perfected himself in any particular work, and that no better service can be rendered, unless he is rescued an untimely end awaits him, and unfortunate are those whom fate turns his way. At all times should we try to make each succeeding operation better than the preceding one, and always strive to improve. This we can do by studying our own weaknesses, and not those of our neighbors. Crown and bridge work today, as exemplified by the best men of the profession, would scarcely be recognized by men who practiced it ten or fifteen years ago. And why this change? The answer is—"The spirit of discontent."

It is not so much the use of crown and bridge work which so often brings about such deplorable conditions in the oral cavity, as the abuse of it. We permit ourselves to be lured on by the commercial side of our profession, and for the time forget the scientific part of it and our sacred duty to our patients; only to awaken, oftentimes, to the realization of mistakes that cannot be corrected.

Crown and bridge work, when practically applied and scientifically constructed, fulfils a most important mission.

I heartily agree with the distinguished essayist when he states that we should often make plaster casts of the case and study them before concluding what is best to do. Much good to patients can be accomplished in this manner. The orthodontist would not attempt to construct his appliances without first concluding, from a study of his cast, the exact course of procedure. Is not the construction of crown and bridge work, in its relative sphere, just as important?

Fixed bridge work has no place in ill-cared-for mouths.

One of the causes of much unhappiness to patient and operator, in both fixed and removable bridge work, is a faulty preparation of abutments. The success of either depends in no small measure on the proper execution of certain mechanical principles. Any abutment which causes irritation at the gingival margin of the gum is faulty. Some contend that no band can be made which will not irritate the gums. I say that it can be done, but for making such a band time and patience are required, since the lack of either causes failure.

Upon what does bridge work depend primarily for its success? It depends upon the faithful observance of certain prescribed mechanical laws. After the perfect adaptation of the band at the gingival margin, the next most important step is an absolutely perfect occlusion. In a perfect occlusion the force of mastication is properly distributed, the stress on abutments is lessened, and harmony is established between the teeth and the muscles of mastication. How many of us, in years past, have made bridges the sight of which would now cause us profound regret, to say nothing of the patients' regret!

Why do we want the mouth to be hygienic? Why such stringent laws to make it such? On account of the dire results which follow neglect.

Can we expect the stomach to perform not only its own function, but also the functions of the teeth? If mastication be impaired by the loss of teeth or by faulty appliances, the stomach must necessarily do the work of both. And what of the results, when food is carried to the stomach saturated with all the filth and bacteria found in ill-cared-for mouths, and mouths of patients who wear prosthetic appliances? Only one result can follow—an impaired constitution, made ready for the reception of the first invading disease.

Fixed bridge work will always have its place and will always be used for replacing lost teeth, especially in those patients whose means will not enable them to have something better; but just as the sun's rays and the morning dew are conducive to sweetness in the morning atmosphere, just so much will removable bridge work be to the mouths of the patients who can afford to possess it.

Removable bridge work is destined to occupy a lofty place in the profession. It has survived its infancy, and bids fair to grow and become a strong factor in the revolution through which the profession is passing, and I venture to state that the new domain which it will create will add as much to the profession as any other of its specialties.

I have employed Dr. Peeso's method of removable bridge work, and find it most satisfactory. As compared to other systems, its execution is probably a trifle more difficult, but correspondingly more gratifying. I think when the profession understands Dr. Peeso's method and its principles and possibilities, its employment will become more general. Removable bridge work will, in the individual using it, bring out talent which has lain dormant, and by which he can construct an avenue through which his *clientèle* will pass in an increasing array, carrying as their banner satisfaction and contentment.

Our work has passed that stage where it involves nothing more than purely mechanical construction; while the basic principle of the prosthetic side of our profession will always be mechanical, it has become now an art, and he who is esthetic in his aims attains a standard of art, since we cannot expect to reach our zenith until we incorporate the artistic attainment in our work. The antagonism with which removable bridge work has met is one of the stimulating forces causing it to make manifest its many virtues.

Great was the day when the profession changed its internal relationship. There was a time when every operator kept from his brother any information which might be of some help to him, fearing that his neighbor might profit thereby. It is a cause of great gratification that that day has passed. Great is he who rises above and conquers the passion of jealousy, and gives to his neighbor the help and assistance which enables him better to serve his *clientèle* and the public generally.

Along the pathway of progress and the pathway of the "spirit of discontent" we find the derelicts of many promising careers, and from them we may learn a valuable lesson.

Dr. A. P. BURKHART, Auburn, N. Y. I am pleased to have listened to the paper that Dr. Hulick has given us, because it carries with it not only a description of the manipulative skill necessary in such work, but also a high ideal in the construction of crown and bridge work, an ideal which I believe every dentist within the profession should follow along these lines. I would suggest that no man should insert a piece of bridge work in a mouth that he would not be willing to accept in his own mouth. I have been in practice quite a number of years, and during that period I have made my mistakes, like other members of my profession. I have tried, however, to profit by my mistakes and by the misfortunes of others. I believe that the paper referred to, namely, that by Dr. Hunter, was a little too severe, a little too scathing in its criticisms, and yet it carried with it a force which every American dentist should consider. Within the past spring and summer there have come to my notice the bad and ill effects of extreme types of bridges—bridges which should never have been inserted; that have been a detriment to patients, and have not been of any benefit to the operator who constructed them, because of the dissatisfaction they have eventually caused patients. I believe, in the light in which we now stand, that the result of past experience tends more and more, as Dr. Hulick has well said, toward removable bridge work, which carries with it two factors, one of which is along the line of more sanitary conditions of the mouth, and secondly, a more perfect occlusion. It is a fact which cannot be denied that bridges constructed where the stress of mastication is largely exercised upon metal do not give to the patient that result which can be obtained from a well-constructed removable bridge where porcelain teeth are used.

Dr. Hulick speaks of the return of the patient at stated periods for the inspection of the work. This leads me to say that I have no reason whatever, Mr. Chairman, to change my mind along the lines which I advocated in Atlanta in 1906 for the return of patients for the examination and the removal of fixed bridges, which I at that time advocated, in which gutta-percha or cement was the substance used for the setting.

To me it has been a source of pleasure to have my patients return at intervals to enable me to remove a bridge for careful examination and cleansing, for inspection of the condition of the abutments upon which it rested, and for the giving of treatment if required.

One word more. Dr. Hulick speaks of the use that the casting process has been in crown and bridge work. I make use of the casting process and find it of great value in the construction of crowns and bridges. A method I employ is this: I use what is known as the double system of inlay. For instance, on a devitalized canine, bicuspid, or molar, I place a flat inlay, having a tube attached, and this is cemented fast and accurately to the tooth. The flat inlay is made of 30- to 32-gage metal. I then pour a wax inlay with dowel attached; these are removed, invested, and the casting finished in the usual way. I then assemble the parts of the bridge, solder the parts together and finish and set the same. Thus, you see, I cement metal to metal instead of metal to tooth structure.

Dr. HULICK (closing the discussion). I had hoped to show about fifty slides, mostly comparative, to better illustrate some of the points in the paper.

These pictures would have convinced you of the deleterious effect of badly fitted cap crowns and poorly constructed bridge work. They would have pictured to you some cases of septic poisoning and their correction, and many other failures and corrections. These pictures were to show inefficiency and efficiency, by comparison; to stimulate, not to criticize. They were intended to make us all ashamed at times, and on the other hand, at times, proud—proud to know that crown and bridge work is not all bad, that it can and is made sanitary and serviceable.

Some of the proudest moments of my life have been when I could truthfully say of a service from my colleagues, How beautiful and serviceable! It gives me a thrill of joy, and I never fail to impress patients to appreciate efficiency at all times.

I was glad to hear Dr. Burkhart comment on the golden rule in connection with this work, and I know from my acquaintance with him that he lives up to that rule. The methods he so ably described I have advocated for some years.

Dr. Tileston has taken up some points a little more elaborately than I did in the paper. In a paper of thirty minutes one cannot completely cover the subject. The discussers are expected to take up and enforce thoughts that the essayist has overlooked, or had not the time to consider.

I appreciated Dr. Morris' remarks, because of the fact that I know him to be a successful crown and bridge worker, a man of high ideals and integrity.

In conclusion, I wish to thank the discussers for the generous way they treated the paper, and the audience for the interest taken, and if a few thoughts may be gleaned that will be beneficial, and stimulate to higher ambitions, my object will have been fulfilled.

Dr. PRICE. The next paper on the program for Section I will be that by Dr. J. V. CONZETT, Dubuque, Iowa, entitled "Something on Cavity Preparation for the Gold Inlay."

[This paper is printed in full at page 1321 of the present issue of the COSMOS.]

Discussion.

Dr. THOS. P. HINMAN, Atlanta, Ga. In discussing Dr. Conzett's paper I shall attempt merely to enlarge upon some few items which he has spoken of. In regard to the question of mastering the technique, how frequently, in the construction of gold inlays, beginning with cavity preparation, we miss important points in the technique, and this paper goes so fully into them that it should recommend itself to everyone. As to the influence of the gold inlay on other operative work, I am reminded of the remark of a friend of mine, who said that to him the gold inlay was really a godsend; that he could work at the chair in the morning, make the inlays, and set a dozen of them during his dinner hour. Such an operator invites failure, for it is only by the greatest degree of care in our technique from the beginning to the end that we are able to make a nearly perfect inlay.

As to the methods of cavity preparation, there is just one point that Dr. Conzett failed to bring out as strongly as I had hoped he would, viz, in regard to flat floors and smooth axial walls. How frequently we find that the axial walls have been left rough! If you do not think you leave this wall rough, examine the portion of the wax that comes in contact with it, and see how frequently you find slight excrescences on it. These are formed in the mold, which is exactly the opposite of the wax, and when the molten gold flows to place, it simply rubs and smooths the corners down, and the inlay does not fit. That is one of the main faults in cavity preparation for inlays. The necessary smoothness of the walls, I believe, can be most readily obtained by the use of carborundum stones.

As to margins, Dr. Grieves has called our attention to the fact that, in butted joints in inlay work, the cement is pumped out owing to the suction force of mastication, and that in itself, I think, is a strong enough recommendation for us to bevel or trim the margins in such a way that the cement will be held by the gold lap. Dr. Conzett correctly emphasized that short enamel rods, if left, will break away. The fact that the cement will be pumped out under the influence of mastication makes it doubly important that these short rods be removed, and the margins beveled.

In regard to the question of extension for prevention, I remember when the subject was first discussed years ago, after Dr. Black had brought it out, one of my friends—a man of the old school—said that extension for prevention was extension for destruction. While I realized what a great mistake he was making, and what a great truth Dr. Black was preaching and teaching, still I am convinced that extension cannot be done empirically, but that the extension of each particular cavity must be made according to the anatomical form of the tooth. In some cases, especially where the contact surfaces are very flat, we require much more extension than if the contact surfaces are very slight. These extensions are just as important in all gold inlay work as they are in other filling operations.

In reference to the use of the inverted-cone bur in making the gingival walls of the cavity, I do not think that, in the hands of the average operator, it will serve the purpose so well as the square-end fissure bur, with which there is less chance of making undercuts.

In reference to trimming enamel margins, Dr. Conzett recommends Dr. Black's marginal trimmers, which are wonderful instruments, but recently I have tried a new set of instruments, *i.e.* Dr. Wedelstaedt's trimmers, and I find them much more adaptable.

The essayist failed to emphasize that we are very much mistaken when we assume that the strength of cast gold is equal to that of hammered gold. Cast gold does not have the same strength, and in large cavities where the occlusal surfaces are involved, unless we add some material to the pure gold to make it harder, it will not stand the stress of mastication, because of the fact that it has practically little more strength than lead. But if we add five per cent. of platinum or ten per cent. of pure silver, we shall not affect the casting qualities of the gold, but make a much harder filling and one that will stand the stress of mastication.

In regard to retention, I see many cases in which inlays have failed on account of the mechanical retention; the operators are expecting the cement not to hold the filling in, but to resist the entire stress of mastication. It will not do it. There must be mechanical retention, and as I have often said before, the cavity should be so formed that, when the inlay is in position, without being cemented, it cannot be dislodged by the force of mastication. When this rule is followed carefully, the cement and the proper burnishing of the margins will make the finished filling more perfect than one made by any other method.

Dr. R. H. Volland, Iowa City, Iowa. The main points of Dr. Conzett's essay are well selected, and to my mind it is timely to emphasize and discuss them. Many more factors entering into the making of a good cavity preparation for a gold inlay might be mentioned, but the essayist was shrewed enough to select those broad and general points upon which observing operators could not disagree. Such a paper is very difficult to discuss, unless the discusser merely reiterates. I agree on the whole with the writer's ideas, and shall confine my remarks to some comments on the various portions of his essay.

The operation of restoring lost tooth substance by means of a filling or an inlay may be roughly divided into three steps, namely, (1) preparation of the cavity, (2) adaptation of the filling material, and (3) finishing of the restoration.

These various steps are all interdependent; it is impossible to draw a dividing line between them. In many instances the type of cavity preparation which it is possible to make will determine the kind of filling material. In all cases the kind of filling material to be used will determine the type of cavity preparation to be made—so illustrations of interdependence might be multiplied. Each step must be honestly and faithfully performed, if the finished product is to be what it should. It is absolutely impossible to make a creditable inlay operation in a poorly prepared cavity. True it is that a poor inlay may be made for a well-prepared cavity, but we are now discussing cavity preparation and not the adaptation of the filling material; a well-prepared cavity is the first and most important step toward a successful operation; it bears the same relation to the finished operation that a well-made foundation bears toward the permanence of a building.

Inlay operations that have come under my observation may be divided into three classes. The first are those made by an operator who is satisfied with any cavity form which allows him to cement-in an inlay. Such an operator uses the gold inlay as a short cut to the dollar.

The second class of operations is made by an operator who is essentially a mechanic. He prepares the ordinary cavities well, and makes good inlays. He has fixed in his mind the typical cavity forms and has sufficient mechanical ability to follow them out. But when a case presents which is just a little out of the ordinary, then this sort of operator is found wanting; even if he has a knowledge of the scientific factors entering into cavity preparation, he cannot apply them so as to take care of these partially typical cases.

The third class of operations is made by an operator who has a keen sense of the factors entering into a cavity preparation and also possesses sufficient mechanical ability to apply them. Such an operator sees all the mechanical requirements of the case; he thoroughly appreciates the anatomy, histology, and pathology of the tooth and the surrounding parts, and gives all these factors due consideration. Then, above all, his system of cavity preparation is based upon principles which are founded upon scientific facts. The partially typical case is met by this operator, and is solved by his principles of cavity preparation. True it is that this operator prepares the typical cavity, but his system of cavity preparation is not a collection of set cavity forms. Each case is a problem unto itself, and is treated individually. In this last class of operations one will find the largest percentage of permanent and creditable work.

To my mind the principles of the mode of cavity preparation that comes most closely to fulfilling all the requirements were given to the profession by Dr. G. V. Black. This system has been thoroughly tested for years with the amalgam and gold filling, and has been found to be good. These same principles that have made for good and for permanence can be applied to inlays.

I cannot understand why any dentist who is familiar with the facts of the superficial spreading of caries can object to practicing the principle of extension for prevention in preparing a cavity for a gold inlay. Extension for prevention does not mean a ruthless cutting away of tooth substance. It is founded upon everyday observation, and means merely conservation in dentistry. Some men argue that the cemented margin of a gold inlay is not as susceptible to caries as the margin of a mechanically adapted gold filling. Granting that this be true, let its advocates remember that caries occurs in susceptible *areas* as well as at susceptible *points,* and it would be very unwise to leave the inlay margin in this susceptible area. Furthermore, the cement can produce no immunity except to that part of the tooth which is covered by it. To my mind it is just as good dental practice to follow out the principles of extension for prevention in preparing cavities for gold inlays, as it is good surgery to remove all of the appendix when performing an appendectomy, regardless of whether the entire appendix or only its free extremity is involved.

No one who has studied the comparatively tremendous forces exerted in mastication should be unwilling to subscribe to a system of cavity preparation that provides for a good firm seating and a logical distribution of stress over the remaining tooth substance. Mechanically, flat planes of the cavity walls meeting each other at as nearly right angles as possible answer best for the accomplishment of resistance form. Slightly convex seats, such as pulpal and gingival walls, are not objectionable, when it would necessitate the needless sacrifice of tooth substance to make them flat. Architecturally or mechanically, these slightly convex planes perform about the same function as a flat wall. We should have little respect for the architect who specified a foundation suitable for a two-story frame house for a twenty-story office building; yet every day we observe inlays made by operators who depend upon cement to hold them against many pounds of strain.

There is much to say in regard to convenience form, retention form—not angle retention—and preparation of walls and margins; however, I wish to emphasize just one step in the technique of finishing walls and margins. To my mind the sharp hand-cutting instrument, held with a firm grasp and used with a planing motion, is far superior to any rotating instrument, such as stone disks, etc., for this purpose. In machine shops the planer has long superseded any attempt at using a rotary tool for cutting flat surfaces on hard substances.

Dr. Conzett mentioned the necessity of properly finishing the set inlay. I wish to emphasize that suggestion. Why should a dentist spend energy in preparing a cavity and adapting an inlay, and then not finish the restoration? Cleanliness, if not the operator's artistic sense, should require a smooth surface for the inlay. The contour should also be looked to very carefully. In approximo-occlusal inlays the maintenance of an interproximal space of normal mesio-distal diameter is very essential, if the septal gum tissue is to be kept normal. The embrasures should be open and free, and the contact brought down to a rounded point level with the occlusal plane of the inlay. You will recall that the contact points of molars and bicuspids are located well toward the buccal surface in the natural teeth. The artificial contact point should be moved slightly toward the lingual surface so as to make the buccal embrasures more nearly of the same size and depth as the lingual ones, thus permitting the food to sweep equally freely through them, so that the buccal and lingual margins of the inlay on the approximal surface may be cleaned. This movement of the artificial contact point lingually is of the utmost importance.

I have been teaching the making of gold inlays in our college clinic for several years, and in making them in my own practice I have had gratifying results so far as permanence and service is concerned. It is a great pleasure to have Dr. Conzett, long a leader of the gold-filling enthusiasts in my state, express to you, in so good form, the doctrine which I have been trying to preach, though less eloquently than he, and to practice for the past eight or ten years.

Dr. **Arthur D. Black**, Chicago, Ill. I had not intended to discuss this paper, and therefore shall mention only two points. Dr. Conzett himself reminded me that he forgot to mention in his paper an item of much importance, viz, the finishing of the gingival margin of approximo-occlusal inlays. All will probably agree that there are more failures of proper fit and proper finish at this margin than elsewhere in fillings of this type. The failures of fit are often due to neglect to trim the wax model properly. When the wax is first pressed down into a cavity, a line is made on the wax, indicating the margin of the gingival wall of the cavity; later, when the patient bites down upon the wax, there is a movement of the wax outward from the margin of the gingival wall, and sometimes there is not a very good line left in the wax that remains at that margin. There is liability of mistaking the first line, which has moved outward, for the right one, and, if the wax model is trimmed to that, wax will be left projecting, which will result in a similar projection of the inlay. The finishing of this margin is of the utmost importance to the health of the interproximal gum septum, a point which has been emphasized by Dr. Volland. The dental profession must pay more attention to the slight inflammations of the gingivæ, and nothing is of greater importance in this connection than the proper finishing of the gingival margins of inlays, as well as of all fillings.

The other item I wish to speak of, which is closely related to the first one, is the contact point. Dr. Hinman called attention to the difference between the strength of pure gold cast and pure gold malleted. If two cubes of pure gold, one cast to a specific gravity of 19, and the other malleted to a specific gravity of 19, are each subjected to three hundred pounds' stress, the one which has been cast will be compressed about five times as much as the one which has been hammered. It is important for us to appreciate this when placing gold inlays upon which much stress is to be exerted, not only because there may be a movement of the mass of the gold, especially at the margins, but because the contacts are gradually worn away by the bucco-lingual movement of the teeth and become worn flat, unless a substance that is harder than pure cast gold is used.

Dr. Volland spoke of moving the contact point slightly lingually in approximal restorations in bicuspids and molars. He also said, if I am not mistaken, that he places the contact point even with the occlusal plane of the teeth. This is a mistake that is very commonly made in approximal inlays. The normal position of the contact point is a considerable distance gingivally from the plane of the occlusal surfaces; the occlusal surfaces of the two teeth curve into the interproximal space to form the contact point. Suppose an inlay or a filling is placed in the mesial surface of a first molar, and the contact point is made even with the occlusal surface—when the contact is normally one-fourth or one-third of the length of the crown from that occlusal surface. Is it to be expected that the gum septum will stretch out and reach up to that new contact point? I think that is too much to expect of that tissue. By raising the contact to the plane of the occlusal surface, an area of liability to caries is created on the distal surface of the bicuspid, just gingivally of the new contact point, which cannot have the protection of the gum septum, and which would not be there if the contact point were in the right position. The change in the position of the contact point also reduces the amount of food that passes through the embrasures, and reduces in like proportion the cleansing effect, which means that such change in the position of the contact would necessitate wider cutting of the cavity bucco-lingually, to place the margins in self-cleansing possitions.

Dr. W. E. LUNDY, Memphis, Tenn. This subject appeals to me very strongly. There are just one or two points that I should like to mention which seem to have been passed over. The necessity of a correct contact point has been impressed upon us. Now, in making the wax pattern we very frequently find, after the pattern goes home, that we do not have the contact point as we wish it to be. A simple method of obtaining it correctly is to lay the gold inlay, after it has been cast, on a block of asbestos, place a little piece of solder on the point, and flow it so as to form the desired contact point. It can be made as tight as you wish, and can be ground until the desired amount remains between the teeth. Sometimes it is very difficult to get the proper preparation of cavities in sensitive teeth, unless we use nitrous oxid and oxygen analgesia which is in such common use now. It is also rather difficult to obtain sufficient separation, therefore the wax is difficult to remove without distortion unless the cavity is prepared in the shape desired. The wax model may be taken out of the cavity, and any little undercuts that may exist may be removed; then the wax model is replaced and re-burnished, and it can then be removed without trouble, and all the margins can be finished nicely.

In finishing the cervical wall of the inlay, I have found that the patient will push out the wax and efface the line of the margin, as mentioned by Dr. Black. While the patient holds the teeth together, the margin can be finished with some files devised for treating pyorrhea by Dr. Towner, with which you are all probably familiar, and then the wax model can be removed in perfect shape.

Dr. CONZETT (closing the discussion). There are only one or two points that I would like to bring out in closing—one in regard to finishing the gingival margin, as mentioned by Dr. Black. I asked Dr. Black to speak on that item because I entirely forgot it in my paper, although it is one of the most important steps in making an inlay. More gingival inflammation is produced by improperly fitting bands, crowns, and overhanging margins of fillings than by almost any other cause, and I am glad that Dr. Black emphasized this fact.

I am glad that Dr. Hinman spoke of the difference between cast gold and malleted gold, stating that pure cast gold is too soft for an inlay that it is to receive stress. Pure cast gold may be used in some cases where no stress is to be brought to bear on the inlay, but if there is any stress whatever—and nearly every inlay receives such stress—that it must be made of some such metal as Dr. Hinman indicated.

Dr. Black also spoke of the fact that in making a wax model, after pressing the wax in the cavity and allowing the patient to bite on that, the model becomes distorted. I have found this to be true in many instances. I rarely allow the patient to bite on a wax model now, because of that distortion, which I have found it difficult to get rid of afterward. When the wax is pressed into the cavity, I allow it to cool. Taggart wax hardens at the temperature of the mouth, and need not be chilled. Chilling, in my opinion, affects materially the shrinkage of the wax. I therefore do not chill it, but allow it to harden and then trim the occlusal surface, thus getting away from the distortion caused by the patient's biting on the softened wax. Instead of allowing him to bite into the wax, I allow the patient to try it very gently, and then trim the wax to proper occlusion.

Dr. Black spoke of the contact point. Dr. Volland did not mean what he said, for he would not place the contact point right on the occlusal surface. The approximal surface should, as Dr. Black pointed out years ago, slope toward the contact point in all directions. From the occlusal surface this contact point is also slightly rounded, so that, if sloped as Dr. Volland shapes it, it is not directly on the occlusal surface.

A MEMBER. What would be your opinion as to using 22-karat gold instead of pure gold?

Dr. CONZETT. I use 22-karat gold in all work on the occlusal surface which is to bear stress, but generally I use 23-karat gold.

(To be continued.)

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EDITORIAL DEPARTMENT.

PROFESSIONALISM.

CERTAIN things possess qualities that constantly operate as barriers to their satisfactory definition—they elude all efforts toward their confinement within the limitations that a strict definition implies and imposes. Among these indefinable things are many of the attributes of character that enter into the making of what we refer to as our professional life. What do we mean when we speak of professional life?—or what do we mean even by the individual terms that compose the phrase? In the absence of a formula that will serve as a positive and concrete definition we can often arrive at a fair expression of our intellectual conception of the involved meaning of such indefinable terms by the negative method of exclusion, *i.e.* by stating what they are not. Let us apply this method to a brief analysis of the word "professional" in an endeavor to get at its meaning as the term is generally used.

Whatever obscurities may attach to many of the loosely applied uses of the words "profession" and "professional," one fact stands out with much clearness, namely, that the words have no proper use in connection with the barter and sale of material things. No one has ever heard of a professional clothing-dealer or ironmonger, or of the term being connected with anyone exclusively engaged in the sale of merchandise of any sort. Nor does it appear that the activities of trade furnish any outlet leading toward professionalism in any proper use of the term in the light of its accepted meaning. On the other hand, the producer of things, the craftsman, the artizan, is constantly influenced by the tendency of his constructive art to develop toward professionalism, which it necessarily does in proportion as it advances in excellence as a result of the intelligence and skill expended upon it. The ordinary house-painter is a craftsman whose pecuniary reward is based upon the value of his labor and the sale of the materials that he uses in his work; the artist, whose work embodies the material expression of an inspired intelligence, is rewarded not at all on the basis of the value of the materials he uses, and little if at all for his mere manual or technical skill, but essentially and in a broad sense wholly for that materialization of his intellectual conception which his picture portrays. The fee of the artist is the reward of professionalism, and not the wage of the craftsman or laborer.

Dentistry has slowly developed from beginnings which had to a large extent their roots in craftsmanship of that order which retained the stamp of barter and sale. It has taken many decades for even a fair proportion of its members to emancipate themselves, and to that extent their calling, from the incubus of the idea that in the prosecution of their work they were engaged in the business of selling material things to their patients. The cost of filling a cavity has been largely determined by the material used; fee bills and individual lists of charges have been generally in vogue based almost wholly upon the cost of materials. So generally has this attitude upon the part of the dentist been presented to the public that it has just as generally tended to nullify or refute his claims to being a professional man, and has equally offset the various attempts that have been made to dignify the details of his practice with the outward insignia of professionalism. Patients have been trained to demand low charges for operative work because they have been informed that it is the cost of this or that material that in certain instances makes certain kinds of work expensive. The principle involved is that of commercialism pure and simple, and but thinly veiled with a covering of the mere semblance of professionalism.

Fortunately, dentistry is slowly discovering that its reward does not come from selling things, but for a service of brain and skill in combating disease and remedying its ravages. When it is generally recognized that the justification for a fee is only the skill and intelligence embodied in a service rendered, then shall we have shaken off the incubus of commercialism and advanced to the dignity of a professionalism worthy of the name.

REVIEW OF CURRENT DENTAL LITERATURE.

[*Lancet*, London, April 6, 1912.]

THE TREATMENT OF TRIFACIAL NEURALGIA. ANNOTATIONS.

In its issue of January 27, 1912, the *Lancet* published a paper by Dr. W. Harris on "Alcohol Injection of the Gasserian Ganglion," which was reviewed in the DENTAL COSMOS of April 1912, p. 491. The procedure referred to aims at the prevention of regeneration of nerve fibers, which has been found to occur when only the nerve trunk has been destroyed by the injection of alcohol, the downward growth of new nerve fibrils, to replace those destroyed by the alcohol, being started from nerve cells in the Gasserian ganglion. The destruction of this ganglion by the injection of alcohol saves the patient from the Krause-Hartley operation, with its attendant risk, without subjecting him to the relapses which follow the more peripheral injections of alcohol. A recent paper by Professor Dollinger in *Deutsche Medizinische Wochenschrift* gives a good and critical review of the various surgical forms of treatment of trigeminal neuralgia. Resection of twenty-one branches of the trigeminal nerve in fourteen of Professor Dollinger's patients was followed by relapse in all but one case. Subsequently, the Gasserian ganglion was extirpated in twenty-two cases, the operation having to be abandoned in two other cases on account of severe hemorrhage. Twenty-one patients were permanently cured, and one, who exhibited cerebral symptoms, died. As the operation usually involves the cavernous sinus, and thus causes severe hemorrhage, Professor Dollinger prefers leaving the Gasserian ganglion *in situ*, and instead he extirpates the root of the trigeminal nerve, which is drawn from under the tentorium cerebelli. This modified operation which he has performed in three cases is less obscured by hemorrhage, but it is still a very serious undertaking. Since 1909 Professor Dollinger has largely adopted Schloesser's treatment by injections of alcohol into the nerve trunks, forty-three patients being thus treated for severe trigeminal neuralgia. In most cases the pain returned in a few months, but in a milder form than before. It also disappeared again on repetition of the injection.

In some cases the pain was absent for more than a year, and it is possible that in some of these the cure may prove to be permanent. Compared with the peripheral resection of the trigeminal nerve, the injection of its main trunks is preferable, for though relapses follow both methods, the latter is by far the easier of the two, and for the past two years Professor Dollinger has adopted this method in preference to resection of the Gasserian ganglion. He considers, however, that this radical operation may be advisable for patients whose circumstances prevent their attendance at hospital for the re-injection which the relapses after Schloesser's method so often necessitate. The chemical resection of the Gasserian ganglion itself by the method described by Dr. Harris appears to prevent these relapses, and thus to remove the last argument in favor of the Krause-Hartley operation. But whatever treatment is the best, it is necessary, as Professor Dollinger points out, to be sure of the diagnosis at the outset. The careful examination of the mouth, for example, may reveal the presence of a carious stump, the removal of which may effect an immediate and permanent recovery.

[*Journal of the Allied Societies*, New York
September 1912.]

NEARING DENTAL ANESTHESIA. (EDITORIAL.)

"Painless dentistry" is a phrase which probably was invented when dental operations were first attempted, and it has lived to this day as the embodiment in words of a great human need on the one hand, and, upon the other, as a kind of jocular will-o'-the-wisp, not to be overtaken by man. In late years, however, encouraging progress has been made toward practicable dental anesthesia. Cataphoresis, though not immediately successful, opened a wide path for investigators; then followed "pressure anesthesia," the admixture of nitrous oxid and oxygen, and local injections of novocain and adrenalin. The "dental obtundents" put upon the market from time to time, many of them partially useful, have been innumerable.

It is an open question as to whether the dental profession deserves reproach for having moved so tardily toward this important end. The production of localized anesthesia by the penetration of dense tooth structure —in the control of, without injury to, the vital elements of the dentin—is an achievement far more difficult to compass than that of general anesthesia. It is a blessing, indeed, that relief came first and most easily for the entire body; our lesser and more intricate problem has been delayed by greater natural difficulties. But reproach will justly and speedily come in the future to operators who fail to use the means now available and daily becoming more simple of application.

The administration of ether or chloroform for dental operations is prohibitive because of the danger, and the necessary preparation and care of the patient during each administration. The usual program of ether anesthesia carried out through the filling of a dozen simple cavities would be a criminal absurdity. The nitrous-oxid-oxygen method has come to our help as comparatively safe and simple in those cases of extreme nervous excitability where more than localized anesthesia is needed. C. A. Jameson has reported recently very gratifying results from this method. From present appearances, our ultimate success in obliterating pain during routine dental operations will lie in the simplified use of the nitrous-oxid-oxygen method, or by the control of the dental pulp by local injections which penetrate the cancellous structure of the alveolus and thence enter the circulation at the apical foramina. In all probability both methods will be considered desirable to meet varying conditions. The work of Fischer, Ottesen, and others has resulted in a comparatively safe, sure, and convenient technique of local anesthesia by the injection of novocain and adrenalin or suprarenin.

Three methods chiefly are used: (1) The

needle is carried through the gum tissue and against the cancellous alveolar process; (2) a sensory nerve trunk is reached or approximated by the needle, passing through one of the many foramina; (3) "intra-alveolar" injection—an opening, the caliber of the needle, having been drilled through the outer plate of the alveolar process, the needle is carried deeply into that structure and near the apex of the root of the tooth to be operated upon. Dr. Ottesen's article, already noted, describes very clearly the steps to be followed.

Too great care cannot be taken in the maintenance of asepsis during every step in the use of the syringe. This is self-evident, of course; but just as the niceties of cavity preparation for inlay work have led to higher standards of care, so the necessity for a sterile field and *sterile* instruments in this work will have a salutary influence among even our best operators. The difficulties of attaining oral asepsis during routine operations have laid dentists open to a rather sweeping indictment of negligence from physicians and from the public. This charge often is inconsiderate from a lack of knowledge on the critic's part of the mechanical and other obstacles to be overcome, and of the curious and blessed fact of comparative "mouth immunity," which shields the patient from perpetual infection in that ever-septic cavity. How many millions of open alveoli, unprotected after extraction of the teeth, heal beautifully though filled with putrescent food particles and luxuriant bacteria? What percentage of that number of such wounds, averaging three-quarters of an inch in depth, three-eighths in width, crammed with filth, in any other part of the body, would heal promptly and fill with healthy tissue? But because of this most fortunate circumstance we must not infer that the operator is excused from any care within his reach further to protect the patient from infection. The danger of oral sepsis is always present. The desirability of the best possible surgical technique is undeniable, and the imperative demand for such methods in the operations which are being considered should lead to improvements along this line in general practice.

It seems not unreasonable to believe that dental anesthesia is wholly feasible. That it will not be needed, nor advisable, in the majority of dental operations is probable; but in the future there should be little excuse for real suffering, or for poor cavity preparation—which so long has been the alternative.

[*Deutsche Monatsschrift fuer Zahnheilkunde*, Berlin, November 4, 1912.]

THE RELATIONSHIP OF DENTAL AND NERVOUS DISEASES. BY DR. E. TROEMNER, HAMBURG.

The relationship between dental and nervous diseases are threefold: First, anomalies in the development of the teeth may be symptomatic of physical and also mental backwardness. Thus in idiots, irregular development, giantism, and concrescence of teeth are noted, in microcephalics imperfect development of the jaws and teeth, in cretins retarded growth, dwarfing, and deterioration in the make-up of the teeth. It has been shown convincingly by recent investigations, which are by no means complete yet, that an interesting relationship exists between certain glands, such as the thyroid, parathyroid, the sexual glands, and the pituitary body, and dentition, as well as the general development of bones.

Prognathism is regarded as a symptom of degeneracy, although in the prognathous jaw the teeth are especially strongly developed. Constriction of the maxilla in the presence of adenoid growths is often noted in connection with that state of mental weakness called aprosexia. Pronounced lack of symmetry in the mandibular halves, especially defective development of one of these halves, is indicative of degeneration. Inferior micrognathia is generally regarded as a symptom of general retrogression, probably due to the increasing lack of use of the teeth in mastication, which is also partly responsible for the increase in the frequency of dental caries. It is doubtful, however, whether the increase in neurasthenia stands in any causal relationship with caries. The value of Hutchinson's teeth in the diagnosis of hereditary locomotor ataxia or paralysis has been considerably lessened by the general adoption of the Wassermann reaction.

In a second class we may list those dental diseases which are causative of nervous disturbances. In this class belong the heretofore often wrongly interpreted disturbances of the first dentition, and especially eclampsia. Of greater importance is trigeminal neuralgia, which affects females more frequently than males. Diseased teeth, however, are far less frequently the cause of true neuralgia than other diseases, such as colds, infections, cerebral tumors, etc., and the latter diseases will have to be first eliminated in the diagnosis, before a tooth is considered as a causative factor and treated. Before resorting to dental extraction the remedies generally used in neuralgia should be tried. Pulpitis, pulp-stones, odontomes, and malocclusion may cause neuralgia in the order of frequency mentioned. The writer attributes little value to the hyperalgetic areas of the face, as indicated by Head and Kron, which are supposed to be characteristic for each tooth. Not only are they difficult or impossible to determine, but radiation of the pain very frequently prevents the exact locating of the diseased tooth. Radiation of pain may travel the most remarkable paths, and combine with a reflex or hysterical pseudo-paresis, and often the dental origin of the disease is not proved until some time after the successful treatment of the dental disorder.

Neuralgias after dental operations are explained by the supposition that the previously latent irritation is manifested after the intervention. Phenomena of irritation and paralysis of the tongue, the mouth, and the area supplied by the facial nerve are not as frequently observed as trigeminal neuralgia.

Trismus *per se* or as a precursory symptom of tetanus after dental operations is also rare; the former is probably due to hysteria, or assumes the form of tic douloureux.

Hysterical fainting spells, blindness, St. Vitus' dance, and other alarming conditions have also been ascribed to dental disorders or their treatment. Reports of so-called dental epilepsy, however, can be accepted only if the seizures begin with sensations in the dental system and disappear after removal of the cause.

Cerebral symptoms, similar to those in tumors, may be simulated if in septic pulpitis the infectious matter is prevented from drainage by hermetic sealing of the pulp cavity. Certain neuroses are interesting in this connection, assuming either the form of extreme fear of the dentist and his office—so-called odontophobia—or that of a pathological desire to visit a dental office, viz, odontomania.

In regard to therapeutics for neuralgia, if the removal of the cause does not give immediate relief, the writer recommends first electric treatment, then hypnotic suggestion, especially in young individuals, and endoneural injections of alcohol. In hysterical disorders, rest, isolation, and kindly persuasion, and in trismus an injection of morphin and scopolamin, are indicated.

In a third class we may place dental diseases caused by nervous affections, which are rare, however. The trigeminal nerve or the Gasserian ganglion may become diseased without any trophic or other disturbances being exhibited in the dental system. In the early or later stages of locomotor ataxia, pyorrhea alveolaris, followed by the painless loss of the teeth, is sometimes observed. Spontaneous fracture of the mandible may be indicative of a beginning locomotor ataxia, or complicate the course of this disease. A connection of nervous diseases with pyorrhea alveolaris can be assumed only in so far as in certain conditions of depression the movements of the jaw and oral hygiene are neglected, thus causing dental disease indirectly.

The writer concludes his valuable and very elaborate essay by a discussion of the sexual hallucinations which are frequently experienced by patients, more often of the female sex, especially during analgesia or light narcosis, and which have led to serious accusations of the operator by patients. He urgently advises the presence of a third person during local as well as general anesthesias, and recommends hypnosis as a valuable adjuvant in suitable cases of either form of anesthesia.

[*Le Laboratoire et le Progrès Dentaire*, Paris, August 25, 1912.]

TAKING IMPRESSION OF A ROOT TO BE CROWNED. By H. Léger-Dorez.

To insure perfect adaptation of a gold shell crown, it may be found expedient to take an impression of the root in order to correct any imperfections in the ferrule, or to improve the shape of the root to be crowned.

After preparing the root, the trimmed, pinched, and filed band is adapted to the root as closely as possible. After having been adjusted ready for soldering, hot wax is flowed over the interior of the band so as to form a layer of about 1 mm. in thickness. The band is then replaced on the root, and ligated thereto with strong silk cord, which is drawn as taut as possible. After cooling the wax with a stream of cold water from a syringe, the ligature is cut, and the band can then be readily withdrawn without distorting the impression of the contour of the root in the wax. After cooling the wax again, the band is again ligated to the same extent as it was on the root. The band is then filled with plaster and set on a base of plaster of the same mix. After the plaster has hardened, the wax is washed out with hot water, the band removed, and any inaccuracies in the fit of the band, which formerly not even an experienced eye could have observed, are readily seen. The band is then retouched, and, after the necessary corrections are made, tightly ligated to the model with binding wire, the plaster is removed from the center by means of a spatula, the band soldered, filed, polished, and tried in the mouth, when it will be found to fit the root perfectly.

[*Proceedings of the Royal Society of Medicine*, London, May 1912.]

"DERMOID TEETH," OR TEETH DEVELOPED IN TERATOMATA. BY W. MCADAM ECCLES AND A. HOPEWELL-SMITH.

The authors have investigated into the exact position of "dermoid teeth," or teeth developed in teratomata, in relation to the teratomatous tissue and the actual cyst wall, and state that such teeth may be found embedded in bone in actual alveoli or sockets, in soft tissue either of the fetus, or possibly of the cyst wall, or free within the cyst cavity. The morphological variations in teeth associated with ovarian teratomata approximate very closely to those usually found in the human mouth. The premolariform and caniniform types predominate from the point of view of number, which in some cases is simply enormous. Some of the pieces of bone in which these ovarian teeth have been found are exceedingly like small maxillæ or ill-developed mandibles. One peculiarity, however, is often present, namely, that whereas the size of the "jaw" itself is much less than the size of the jaw of the host, the teeth themselves found in the ovary may be almost, if not quite, as large as those found in the normal mandible of the host. The bone itself is of poor quality, and consists mainly of cancellous tissue. There are on record several cases of a dermoid cyst of the testis in the human subject, but the condition must be considered as an extremely rare one.

This presence of teeth in dermoid cysts of the ovary and of the testis tends to prove the teratomatous nature of these tumors. The similarity between dermoid cyst teeth and those of the normal human mouth tends further to indicate their teratomatous origin. The period of eruption of the dermoid teeth does not coincide with the period of eruption of the teeth of the host, but is probably earlier, and their growth is more rapid. It is possible that this precocity may be due to the influence of the super-host through her blood. There is no distinct evidence of the shedding of dermoid teeth, and there is no evidence of any distinction between a deciduous and a permanent dentition. While dermoid teeth may be ill-shaped and may otherwise deviate from the form of normal teeth, there is no evidence of any pathological process which can be termed "caries." An examination by X rays should be made of every case in which an ovarian dermoid is suspected. It is probable that dermoid teeth will throw a shadow, and this shadow will be a help in the diagnosis of the condition, and lead to the early and safe removal of the cyst.

A number of very interesting illustrations showing the contents of several teratomatous ovarian cysts, photomicrographs showing the histological structure of dermoid teeth, and skiagraphs of dermoid cysts of ovaries and their contents illuminate this paper.

[*La Province Dentaire*, Lyons, May 15, 1912.]

CONTRIBUTION TO THE STUDY OF THE CONCRESCENCE OF TEETH. BY DR. A. PONT.

While dispensing with a new classification of this anomaly, and merely reviewing the none too fruitful efforts of previous writers in this direction, Pont describes the seven cases which he has personally observed in a practice extending over fourteen years, as follows: In the case of a young woman of eighteen years the upper right central and lateral incisors were entirely fused. In another case the deciduous upper right lateral was fused with a permanent tooth. Three cases exhibited concrescence of second and third molars, once in the upper, twice in the lower jaw.

The deciduous dentition is less subject to concrescence than the permanent teeth. In the incisor and molar region this anomaly is observed most frequently, although cases of fusion between the second bicuspid and the first molar and the canine and lateral have been recorded.

In one case of extraction, the distal root of a lower right first molar was found by Pont to be united with the mesial root of the second molar by a sort of strong, fibrous ligament of about 2 mm. diameter, half-way between the apex and the neck, so firmly that the mesial root of the second molar came away with the extracted first molar.

As for treatment, fused deciduous teeth should be let alone. In the permanent dentition, if fused anterior teeth disturb esthetic appearance or normal occlusion, treatment is advised. If the anomaly concerns the molars, no intervention is necessary. If the roots of molars are fused together, as difficulties in extraction may lead one to suspect, a definite diagnosis can be obtained only by the radiograph. Even then, the extraction of these teeth will present difficulties.

[*Deutsche Monatsschrift fuer Zahnheilkunde*, Berlin, July 1912.]

REPLANTATION AND ITS SUCCESS. By ZAHNARZT R. NEUMANN, BERLIN.

Replantation, while it is to be considered as a last resort in cases where all usual methods of root-canal treatment cannot save a tooth, is indispensable in the following cases: If a tooth is loosened or lost entirely by trauma, even if it has been out of the mouth for some time; in accidental extraction of a tooth; in pericementitis which does not yield to root-canal treatment or resection of the apical portion of the root; in preserving the first molars in children who will not submit to prolonged treatment of the roots of this tooth, and in pyorrhea alveolaris, if the patient's impatience or technical difficulties do not permit of thorough scaling of the pyorrheal teeth. In the last case, even if the alveoli have been destroyed to a considerable extent, the teeth become firm again, provided a suitable splint has been applied.

The author's technique is as follows: After disinfection of the mouth with hydrogen dioxid, any tartar present is removed from the tooth to be extracted and replanted, and the gingival tissue within the field of operation is painted with tincture of iodin. The tooth should be extracted under general anesthesia or under conductive anesthesia as advocated by Fischer, since topical injection would produce a disturbance in circulation which would unfavorably influence the healing process. Every injury of the mucous membrane or the periosteum, also fracture of the tooth, is to be avoided. The tooth to be replanted is washed in physiologic sodium chlorid solution, and its root surfaces are freed of all granulations, etc. The root apices are resected, if necessary, and the roots, if their divergent or tortuous shape, as in molars, renders the reintroduction of the tooth difficult, are resected or ground off. The root-canals, if easily accessible from the pulp-chamber, are filled with paraffin-thymol points; if the root-apex has been resected, the pulp is removed from the apex, and the canal filled with an ivory point. Before reintroducing the tooth into the alveolus, all coagulated blood and granulations are removed from the fundus, and the replanted tooth is held in place by a celluloid splint. Replantation is contra-indicated in multi-rooted teeth, if the X ray shows that the root walls have become very thin owing to absorption, so that their fracture during extraction would be inevitable. If the root of an otherwise strong tooth has been slightly fractured during the extraction, the fractured portion can be removed, and the tooth may still be reimplanted with success. Isolated teeth also can be replanted successfully, also deciduous teeth. In most cases replanted teeth become firm without complications, and remain so regardless of the patient's age. Only in rare cases are the roots resorbed, and even if the alveolar process has disappeared to a great extent, as in pyorrheal patients, the replanted teeth are held firmly by a sort of firm connective tissue. The author strengthens his arguments by a series of well-taken radiographs of practical cases.

PERISCOPE.

Water for Arkansas Stone.—Water used on the Arkansas stone when sharpening instruments is just as efficient as oil and more cleanly.—*Dental Brief.*

Separating Fluid.—A solution of ivory soap in water, colored with a little indelible ink, is a very satisfactory separating fluid. It dries very rapidly, and the model and impression separate perfectly.—*Western Dental Journal.*

Bumpy Engine Belts.—An engine belt that does not run smoothly over the pulleys is the cause of much discomfort both to patient and operator. The trouble is often caused by little pieces of lint from the belt getting in the grooves of the pulleys, especially the handpiece pulley. These should be cleaned out often; surprisingly good results will ensue.—H. D. LYON, *Dental Review.*

Number of Dentists in Great Britain.—The number of registered dentists in the United Kingdom is 4984, if the foreign registered dentists are included, 5007. Thirty years ago there were 5345, and in 1879, when dentists were registered for the first time, 5289. Of the census number of 1912, 3277 are licentiates and graduates in dentistry, viz, 65.45 per cent., while the rest of 1696, representing 33.87 per cent., are listed as "without any additional qualifications."—*Deutsche Monatsschrift fuer Zahnheilkunde.*

Removing Plaster from a Vulcanite Denture.—Now and again a thin coat of plaster on the palatal surface or between the teeth of a vulcanite denture proves difficult of removal, especially if the case is not promptly removed from the flask after vulcanizing. The denture is placed for a few minutes in a cold mixture of about equal parts of sulfuric acid and water, or the "pickle pot;" no injury is done to the denture, while the plaster is softened or dissolves, so that a little work with a brush wheel leaves it clean.—W. H. TRUEMAN, *Dental Brief.*

Packing Vulcanite Dentures.—After separating the flask and washing out all the wax first by means of boiling water, then by flowing chloroform around the pins of the teeth, the labial and buccal surfaces where the pink rubber is to be packed are painted with a solution of red rubber dissolved in chloroform. This facilitates placing the pink rubber in the desired places, especially the triangular spaces between the teeth, without the inconvenience of its being continually displaced, so that it must be held there during the entire packing operation. A well-stoppered bottle of the red rubber solution should always be kept on hand. After vulcanizing, the shallow coat of red rubber covering the pink can be polished off by a few turns of a sandpaper chuck.—A. C. BRECKENRIDGE, *Western Dental Journal.*

Removable Pin Teeth.—Removable pin teeth, especially molars and bicuspids, may occasionally be used on metal dentures in place of soldered-on teeth. They have, however, one disadvantage; they must be removed in case the denture requires to be soldered in making repairs. They may stand fire, but the risk is great. If the teeth are long they may be held with gutta-percha instead of cement, and in that case are readily removed and replaced. Special care is needed to strongly solder the pins to the plate, using plenty of solder at the base of the pin, and seeing that it flows freely. They make a neat finish, have a natural feel to the tongue, require less labor and less material in construction, and are strong and cleanly. It must be borne in mind that they do not stiffen the plate as do the soldered backings of ordinary plate teeth, therefore the plate must be made stronger. Several makers present molds much more natural in shape and character than are the molds of plate teeth, and as there are now so few plate teeth used, the stock of dowel teeth is better kept up. Keeping the stock does not entail so much capital tied up in expensive platinum pins, therefore the stock is more likely to be kept well up to date and in good variety.—W. H. TRUEMAN, *Dental Brief.*

Round Envelopes for Dental X-Ray Films.—A black envelope such as is used for the inner envelope in X-ray plate work is cut into small sections of any desired size, using the edge of the envelope, where the fold forms one side of the smaller envelope. The corners are trimmed round, and two pieces of film, with the emulsion sides toward each other, are cut to fit the round envelope. This envelope is then sealed with black passepartout paper, and inclosed in oiled tissue paper. A small tab of white paper may be placed on the envelope on the edge covered by the passepartout paper, to identify easily that part of the envelope when in the dark room. The envelope is easily slit up with a knife at this point, the films removed, and new ones inserted. The envelope is again covered with passepartout paper. Films may be made from the ordinary film roll, film pack, or moving picture films. Those which lie flat are better, as they do not curl while being cut nor during development. These envelopes require very little time to prepare. They are more comfortable to hold in the mouth, can be made of any size to suit the needs of the case, and by their use a larger area of teeth and maxilla can be shown than on the ordinary rectangular film.—R. Hammond, *Dental Brief.*

Diagnosis and Treatment of Chronic Alveolar Abscess.—The following method of diagnosis and treatment of chronic alveolar abscess is recommended:

Diagnosis. (1) History of case; (2) examination of the periapical tissues; (3) radiograph if necessary; (4) examination of the root-canal.

Treatment. (1) Extraction as a general rule, if there is much denudation of the root and the tooth is loose, or if much denudation and the tooth is not loose, if the tooth involved is any lower tooth other than a first molar with but one root affected; (2) thorough cleansing and filling of the root-canal in cases in which the injury to the attachment of the peridental membrane has been slight; (3) amputation, if much denudation of the roots is present in molars, provided the remaining root or roots are in good condition; (4) resection, if considerable denudation is present, and the tooth is not loose—this for upper front teeth, and occasionally upper bicuspids and buccal roots of upper molars. In cases of the last two classes it is understood that the root-canal should be thoroughly cleansed, and a root filling made previous to the operation of resection or amputation.—A. D. Black, *Dental Review.*

Platinum Solder Formula.—The formula for this solder is as follows: To 360 grains of pure gold, which has been fused and kept at the boiling-point in a carbon crucible, are added 120 grains of exceedingly thin pure platinum, the latter having been cut into narrow strips and gradually fed into the boiling gold.

When the boiling mass has taken up all of the platinum the intense heat is kept up until a point of incandescence has been reached, and a light produced which is too intense for the eye to tolerate. It is imperative that the operator wear blue or amber colored glasses to protect the eyes. The molecular union of the two metals having taken place, the ingot is allowed to cool somewhat and is then plunged into water, and thence into an acid bath for the purpose of proper cleansing. It is flattened upon an anvil and then rolled down to a 26-gage thickness. The plate thus obtained gives us a 25 per cent. platinum solder, which should be properly marked in several places and is ready for use. This solder, if kept thoroughly clean, requires no flux.—H. E. S. Chayes, *Dental Forum.*

Finishing Amalgam Fillings.—Nothing could be more hideous than a coronal cavity in a lower molar filled with a formless plug of amalgam. The carving of the filling is most interesting, and is easily carried out. What is more, I am inclined to believe that this carving, by dividing the surface into little hills and valleys, may possibly control the shrinkage of the amalgam should it occur. We all know that in placing a porcelain body upon its platinum base, we score it into squares so that contraction may take place about each square as a center. In the same way it is not unlikely that any marked surface contraction, should such a thing occur, might, by carving cusps and fissures upon it, be converted into a series of little contractions, thus minimizing the fault to a certain extent. At a subsequent sitting, the filling must be polished with finishing burs, then with pumice on orange-wood sticks in the porte-polisher. A word of caution is necessary in regard to the first dressing of this filling with the bur. Amalgam is more or less brittle, and it is quite easy to crush it at the margins of the cavity by too rough handling. In this particular it resembles—only to a less degree—synthetic cement, which we all know may be ruined as a filling by the careless use of coarse disks and strips. —J. M. Lewis, *Australian Journ. of Dentistry.*

Synthetic Rubber.—The artificial production of rubber has for long loomed ahead as particularly fascinating to the increasing number of consumers outside of dentistry; but as the earliest experiments in the wonderful vulcanization process were mostly undertaken in connection with dental prosthetic work, and at first of comparative unimportance otherwise, the research will have at least a traditional or antiquarian interest for us. As a laboratory curiosity, "made" rubber, plain or "vulcanized," either hard or soft, by modifications of the process which promised to banish even the heat "vulcanizer" or "digester," has been known in very small, expensive quantities, but recent advances are very striking. In 1906, Professor Wyndham Dunstan, before the British Association, dealt with the transformation of the hydrocarbon isoprene, by polymerization in contact with certain substances, into rubber possessing, it was said, all the properties of the natural substance. Isoprene was obtained from oil of turpentine, the high cost of which put the method commercially out of court. But isoprene can also be made from butyl alcohol, which can be obtained from starch by fermentation.

Renewed interest has been excited by a paper lately read by Dr. W. H. Perkin before the Society of Chemical Industry. He described the process of making synthetic rubber, which he said might possibly be carried out at a cost of a shilling a pound. Dr. F. E. Matthews and Professor Carl Harries, of Kiel, both independently ascertained that isoprene left in contact with sodium was converted into solid rubber. Professor Harries was the first to publish his results, but Dr. Matthews was the first to make the observation. The action is catalytic and appears to be continuous. There are also other methods of bringing about this change in isoprene.

What the reply of the planter (with his ever-increasing price for the precious product in dwindling supply) may be, should be both financially and technically interesting.—*British Dental Journal.*

Elimination of Lockjaw.—It is claimed by Benjamin that lockjaw, due to puncture and injuries, can be entirely eliminated and the death-rate from this disease reduced to nothing. He has never had lockjaw develop in one of his patients, including about 10,000 injuries of all kinds, among them rusty-nail and other punctures of feet and hands. This was accomplished in a locality where lockjaw is endemic, twenty cases having been reported in one year. His instructions are to sterilize the field of injury, especially the deep edges of the wound; large and open wounds are irrigated. The vast majority of cases of lockjaw, however, develop from punctural wounds. Insert a few drops of alcoholic solution of cocain; have on hand variously sized screws, the threads of which should be at an angle of about 25° to the axis of the screw, and thin. A set of screws should range from the size of a small probe to 5/16 of an inch in diameter, so as to be ready for all-sized wounds, such as those from nails, pitchfork tines, dog-teeth, and so on. In the absence of these special instruments, however, one can often use an ordinary aluminum applicator, which has threads on; or one can procure from any hardware store ordinary screws, which answer very well for many cases. Dip the sterilized screw into an antiseptic solution, say, two or three per cent. lysol. The liquid is held by the spiral gutter. The screw should be of a size to follow the track of the wound easily. If the skin is hard—like the sole of the foot—and the wound entrance is tightly contracted, it may be nicked with the point of a knife. As the screw is being inserted it is kept turning, but held back, so that by the time it has reached the bottom it has been turned enough to have carried it more than twice as far; it is now given a few more turns. In this way foreign substances and microbes are lifted—screwed—out. The instrument is then pulled out and washed in an antiseptic; then dipped in tincture of iodin, if not a large puncture, and then forced down to the bottom of the wound, and given a few turns backward. Then the screw is dipped into carbolized oil—one minim of carbolic acid to fourteen of pure olive oil—and pushed gradually to the bottom of the wound, turning backward, then unscrewed out. These antiseptics have the property of permeating the surrounding tissues. Dress the wound in the usual antiseptic manner, and no germs will live in that wound. Benjamin says even when one has immunized with antitoxin, this local treatment should be used in all puncture and Fourth-of-July wounds, for the good reason that it not only prevents lockjaw by killing the bacilli, but is equally efficacious against streptococci—blood poison and erysipelas—and staphylococci—abscess and inflammation.—*Journ. Amer. Med. Association.*

HINTS, QUERIES, AND COMMENTS.

PARAFFIN TREATMENT OF CHALKY ENAMEL.

Paraffin as a root-canal filling has received a great deal of attention in dental literature recently. In the writer's opinion, it is logically indicated in the treatment of chalky enamel as a check to its disintegration, and has been used successfully for this purpose by him for twenty years. Paraffin is the therapeutic agent *par excellence* for the chalky condition of the teeth almost invariably found in epileptics.

The method of application consists in desiccation, warming the tooth to be treated, and applying the paraffin with a hot instrument.

F. E. Gutelius, D.D.S.

Millheim, Pa.

OBITUARY.

Brief Necrology.

Dr. J. T. Webb of Houston, Miss., on September 10, 1912.

Dr. J. W. Ewin of Salt Lake City, Utah, on September 8, 1912.

Dr. Beverly E. Mead of Greenwich, Conn., on October 13, 1912, in his eightieth year.

Dr. John J. Villars of Brooklyn, N. Y., on October 16, 1912, in his seventy-fifth year.

Dr. W. T. McLean of Cincinnati, Ohio, on October 10, 1912. Deceased was a graduate of the Ohio College of Dental Surgery.

Dr. Nathan A. Kelly of Lincoln, Ill., on June 28, 1912, of Bright's disease. Deceased was a graduate of the Ohio College of Dental Surgery.

Dr. David R. Longenecker of Rockville Center, L. I., on July 28, 1912, in his sixty-fourth year. Deceased was a veteran of the civil war.

Dr. Wm. H. Merritt of Norfolk, Ohio, on August 27th, of neuralgia of the heart. Deceased was a graduate of the New York College of Dentistry.

Dr. David J. Joynes of Baltimore, Md., on September 28, 1912. Deceased was a graduate of the Dental Department of Baltimore Medical College.

Dr. Maurice F. Elliott of Franklin, Pa., on September 1, 1912. Deceased was a graduate of the Dental Department of the University of Pennsylvania.

Dr. H. B. Scarsdale of Waterloo, Ill., on October 10, 1912, in his thirty-eighth year. Deceased was a graduate of the Marion-Sims Dental College, St. Louis, Mo.

Dr. Jacob H. Frees of New York, N. Y., on July 23, 1912, of pneumonia, in his thirty-third year. Deceased was a graduate of the New York College of Dentistry.

Dr. Sarah Conklin Gramm of Keokuk, Iowa, on October 11, 1912, of acute indigestion. Deceased was a graduate of the Northwestern University Dental School.

Dr. Jesse Porter of Chicopee, Mass., on August 1, 1912, following an accident, in his seventy-eighth year. He was a member of the Massachusetts State Dental Society.

Dr. Thomas T. Fauntleroy of Staunton, Va., on August 23, 1912, of heart failure. Deceased was a graduate of the Dental Department of the University of Maryland.

Dr. Charles Samuel Bartlett of Boston, Mass., on September 10, 1912, in his sixty-fourth year. Deceased was a graduate of the Harvard University Dental School.

Dr. Frederick W. Joslin of Big Rapids, Mich., on August 22, 1912, in an automobile accident. Deceased was a graduate of the College of Dental Surgery of the University of Michigan.

Dr. Reynolds M. Sleppy of Pittsburgh, Pa., on July 25, 1912, of kidney trouble, in his thirty-second year. Deceased was a graduate of the School of Dentistry, University of Pittsburgh.

Dr. Frank B. Faber of San Diego, Cal., on June 27, 1912. Deceased was a graduate of the Philadelphia Dental College, and for years dentist to the court of Abdul Hamid, the now deposed sultan of Turkey.

Dr. Charles M. N. Latimer of Washington, D. C., on August 7, 1912, in his fifty-fifth year. Deceased was a graduate of the Baltimore College of Dental Surgery, and member of the Dental Society of the District of Columbia.

Dr. Walter S. Kenyon of Providence, R. I., on August 15, 1912, in his forty-eighth year. Deceased was a graduate of Tufts College Dental School, and for several years secretary of the Rhode Island State Board of Dental Registration.

Dr. William A. Barrows of Buffalo, N. Y., on August 29, 1912, of bronchial pneumonia, in his sixty-fifth year. Deceased was a graduate of the Philadelphia Dental College, and a member of the Buffalo Dental Association and the Eighth District (N. Y.) Dental Society.

Dr. Charles Delano Cook of Brooklyn, N. Y., on September 5, 1912, in his eighty-seventh year. Deceased was an associate fellow of the American Academy of Dental Science and member of the New York Institute of Stomatology, the Kings County Medical Society, the American Association for the Advancement of Science, the National Geographical Society, and the Odontological Society of Great Britain.

SOCIETY NOTES AND ANNOUNCEMENTS.

OHIO STATE DENTAL SOCIETY

The committee appointed to prepare for the holding of the forty-seventh annual meeting of the Ohio State Dental Society, in Cincinnati (Sinton Hotel), Ohio, December 3, 4, and 5, 1912, are still diligently carrying on their work.

PROGRAM.

President's Address. C. R. Converse, Springfield.

"Professional Ethics." H. C. Brown, Columbus.

"Oral Surgery." G. V. I. Brown, Milwaukee, Wis.

"Removable Bridge Work." Chas. F. Ash, New York city.

"Instrumentation in Pyorrhea Treatment." A. F. James, Chicago, Ill.

"Diagnosis of Diseases of the Pulp." Hermann Prinz, St. Louis, Mo.

Lecture, "Venereal Diseases," illustrated by stereopticon and moving pictures from actual subjects, by E. A. Deeds of Dayton, Ohio.

The medical societies before which it has been presented pronounce this lecture a wonderful exhibit. It is needless to call attention to the growing necessity for a thorough understanding of these diseases by the dental profession.

The local Oral Hygiene Committee will give a practical exhibition of their school work, having a whole school at work in its own school building, under the direction of the Oral Hygiene Committee of the Cincinnati Dental Society, giving every detail of the work, from primary examinations up to operative work.

The practical working of all the latest phases of dental radiography will be demonstrated by Dr. Sidney Lange of Cincinnati. One of the most complete outfits will be set up, and radiograms taken, developed, finished, and delivered on the spot.

The clinics will be very attractive.

F. R. Chapman, *Sec'y*,
305 Schultz Bldg., Columbus, Ohio.

INSTITUTE OF DENTAL PEDAGOGICS.

The next annual meeting of the Institute of Dental Pedagogics will be held in Pittsburgh, Pa., January 28, 29, and 30, 1913. An unusually interesting program has been arranged, and no progressive dental teacher can afford to miss this meeting.

Fred W. Gethro, *Sec'y*,
Chicago, Ill.

ACADEMY OF STOMATOLOGY.

The annual meeting of the Academy of Stomatology will be held on Tuesday, December 17, 1912, at the College of Physicians, Twenty-second, above Chestnut st., Philadelphia, Pa., at 8 P.M. There will be an election of officers for the ensuing year and a discussion of silicate cements.

All members of the dental profession are invited to be present.

Norman L. Jameson, *Sec'y*.

CHICAGO DENTAL SOCIETY.

The officers of the Chicago Dental Society are planning a large celebration for Friday and Saturday, January 31 and February 1, 1913. The program includes two days of clinics by selected men from all parts of the country, one evening of papers by men of international reputation, concluding the two days' meeting with a testimonial banquet to our esteemed *confrère*, Dr. Truman W. Brophy of Chicago.

The dentists of Chicago will make every effort to see that the entire program will eclipse all former meetings. Any dentist who has a new or interesting clinic to give at this meeting is cordially invited to correspond with

Fred W. Gethro, *Ch'man of Clinic Committee*,
917 Marshall Field Bldg., Chicago, Ill.

MINNEAPOLIS DENTAL SOCIETY.

Change of Date of Meeting.

The annual midwinter meeting of the Minneapolis Dental Society will be held in the Masonic Temple, Minneapolis, Minn., Friday and Saturday, January 17 and 18, 1913.

Space has already been reserved for even a larger manufacturers' exhibit than was given last year. Clinics will be given by some of the best men in the profession, who will demonstrate all of the newest and most useful methods.

The entire meeting is to be conducted along unique and original lines—a new method of arranging the exhibits, a different and better way of classifying clinics, also many other new things which will add to the pleasure and profit of each visitor.

For information address

O. DeForest Davis, *Sec'y*,
404 Donaldson Bldg., Minneapolis, Minn.

EASTERN DENTAL SOCIETY OF THE CITY OF NEW YORK.

A regular monthly meeting of the society was held at the Café Boulevard, 156 Second ave., N. Y., November 7, 1912.

A paper entitled "Local Anesthesia as of Interest to the Dentist" was read by Dr. Wm. J. Lederer. The president of the society, Dr. M. A. Schwartz, having been compelled to resign on account of ill health, ex-president Dr. Wm. J. Lederer was re-elected to fill the office of president.

Postgraduate instruction will commence December 1912, to which only members in good standing are eligible.

A. LeWitter, *Sec'y*.

CALIFORNIA BOARD OF EXAMINERS.

The next meeting of the California Board of Dental Examiners for the purpose of examining applicants for a license to practice dentistry in the state of California will be held in San Francisco, beginning on December 4, 1912, at 10 A.M.

For further information, address

C. A. Herrick, *Sec'y*,
133 Geary st., San Francisco, Cal.

IOWA BOARD OF EXAMINERS.

The next meeting of the Iowa State Board of Dental Examiners for the examination of candidates will be held in Des Moines, commencing December 9, 1912. For application blanks and particulars write

J. A. West, *Sec'y*,
417 Utica Bldg., Des Moines, Iowa.

RHODE ISLAND BOARD OF REGISTRATION.

The Rhode Island Board of Registration in Dentistry will meet for the examination of candidates at the State-house, Providence, R. I., Thursday, Friday, and Saturday, December 26, 27, and 28, 1912. Application Blanks and particulars may be obtained from

H. L. Grant, *Sec'y*,
1025 Branigan Bldg., Providence, R. I.

PENNSYLVANIA BOARD OF EXAMINERS.

The next examination of the Pennsylvania State Board of Dental Examiners will be held in Musical Fund Hall, Philadelphia, and at the Dental Department, University of Pittsburgh, on Wednesday, Thursday, Friday, and Saturday, December 11, 12, 13, and 14, 1912. Application blanks can be secured from the Department of Public Instruction, Harrisburg.

Alexander H. Reynolds, *Sec'y*,
4630 Chester ave., Philadelphia, Pa.

WISCONSIN BOARD OF EXAMINERS.

The Wisconsin State Board of Dental Examiners will convene in Milwaukee, at the Wisconsin College of Physicians and Surgeons, on Tuesday, December 17, 1912, at 10 A.M., for examination of applicants to practice dentistry in Wisconsin.

A high-school diploma, application, and twenty-five-dollar fee must be filed with the secretary fifteen days prior to above date; dental diploma to be presented in advance of examination.

F. A. Tate, *President*,
W. T. Hardy, *Sec'y*,
422 Jefferson st., Milwaukee, Wis.

NEW HAMPSHIRE BOARD OF REGISTRATION.

The next meeting of the New Hampshire Board of Registration in Dentistry, for examinations, will be held December 4, 5, and 6, 1912, at Masonic Banquet Hall, Manchester, N. H.

A. J. Sawyer, *Sec'y*,
Manchester, N. H.

NEW JERSEY BOARD OF EXAMINERS.

The New Jersey State Board of Dental Examiners will hold their regular annual meeting and examination in the Assembly chamber of the State-house at Trenton, N. J., December 2, 3, and 4, 1912. Application must be filed ten days prior to the meeting. For further particulars apply to

Chas. A. Meeker, *Sec'y*,
29 Fulton st., Newark, N. J.

COLORADO BOARD OF EXAMINERS.

The next regular meeting of the Colorado State Board of Dental Examiners will be held at the Capitol, in Denver, beginning Tuesday, December 3, 1912.

All applications for examination must be filed with the secretary before that date. Examinations are theoretical and practical, and applicants must be prepared to do such practical work as required.

For further particulars, address

J. L. Howell, *Sec'y*,
532 Mack Block, Denver, Colo.

NORTH DAKOTA BOARD OF EXAMINERS.

The next meeting of the North Dakota Board of Dental Examiners will be held at Bismarck, N. D., January 14, 1913, and continuing four days. All applications for examination must be in the hands of the secretary by January 4th. No other meeting will be held until July 8, 1913. Fur further information apply to

F. A. Bricker, *Sec'y*,
Fargo, N. D.

ARMY DENTAL SURGEONS.

MEMORANDA OF CHANGES.

For the week ending October 19, 1912:

First Lieut. John T. Hess arrived at Fort Douglas, Utah, from Camp Nogales, Ariz., October 1st.

For the week ending October 26th:

James F. Feely, ACT.D.S., October 18th, arrived at Fort Wood, N. Y., for temporary duty.

First Lieut. G. L. Mason arrived at Fort Brady, for temporary duty.

C. B. Seely, ACT.D.S., arrived October 18th, at Fort Sam Houston, Texas.

W. A. Squires, ACT.D.S., October 16th, arrived at Fort Robinson, Nebr., for temporary duty.

First Lieut. E. P. Tignor, October 22d, arrived at Fort Washington, Md.

For the week ending November 1st:

J. F. Feely, ACT.D.S., reported at Fort Wadsworth, N. Y., for duty on October 26th.

For the week ending November 9th:

First Lieut. J. H. Hess arrived at Fort Yellowstone, Mont., October 25th.

UNITED STATES PATENTS

PERTAINING OR APPLICABLE TO DENTISTRY

ISSUED DURING OCTOBER 1912.

October 1.

No. 1,039,683, to EDWARD H. ANGLE and J. LOWE YOUNG. Dental tooth-regulating appliance.

No. 1,039,728, to JOHN M. GILMORE. Dental apparatus.

October 8.

No. 1,040,424, to WILLIAM A. SALT. Dental plugger.

No. 1,040,490, to ALECK. BAUER. Dental floss package.

No. 1,040,571, to HENRY P. OSBORN. Artificial tooth and method of making same.

No. 1,040,959, to FERDINAND C. KUINDERS. Tooth-brush.

October 15.

No. 1,041,098, to IRVING B. KENNEY. Dental gold-cap-crown remover.

No. 1,041,270, to ALFRED GYSI. Dental articulator.

No. 1,041,315, to LEON L. MARX. Protective covering for tooth-brushes.

No. 1,041,601, to VAN BROADUS DALTON. Dental pivot crown remover.

October 22.

No. 1,042,039, to JACOB B. SCHLUND. Dental disk guide.

No. 1,042,105, to THOMAS GOODHUGH. Artificial tooth.

No. 1,042,133, to FRANK L. MARSHALL. Combined dental speculum and saliva ejector.

October 29.

No. 43,188, design patent, to ALBERT C. CLARK. Frame for anesthetic-administering apparatus.

INDEX TO VOLUME LIV.

1912.

First pages of monthly issues: JANUARY, 1. FEBRUARY, 137. MARCH, 261. APRIL, 397. MAY, 509. JUNE, 641. JULY, 745. AUGUST, 853. SEPTEMBER, 973. OCTOBER, 1081. NOVEMBER, 1193. DECEMBER, 1301.

ABELL, B., on dental impaction and preventive treatment, 63
Abnormalities, dental, as explained by accidental splitting of tooth-germs, R. C. Osburn on, 1200
Abscess, alveolar, plastic operation for naso-oral fistula, and operation for mandibular necrosis, 130
  chronic alveolar, amputation of apical root end as treatment in, aided by skiagraphs made at same sitting, E. B. Lodge on, 450
  chronic alveolar, diagnosis and treatment of, 1382
  chronic alveolar, treatment of, 1290
  chronic alveolar, with fistula discharging on face, treatment of, L. W. Doxtater on, 669
  dental, due to dentist's neglect, M. L. Rhein on, 531
  dental paraffin injection for disfigurement following, 494
Abscesses, blind, and their effects, M. L. Rhein on, 1243
  chronic, I. N. Carr on, 446
  dental, treatment by atmospheric pressure, D. H. Young on, 447
  of prolonged duration, X-ray diagnosis of, J. J. Moffitt on, 873
  subperiosteal, and empyema of maxillary antrum, differential diagnosis of, M. N. Federspiel on, 1303
  subperiosteal, due to hypodermic injections, 1302
  X-ray diagnosis of obscure, J. J. Moffitt on, 871
Abutment shell crowns, strengthening, W. S. Rose on, 229
Academy of Stomatology, announcement, 1297, 1386
Acidity of the mouth, general, R. W. Bunting on, 543
Acidosis, post-anesthesia, 494
Acids in the mouth, difficulties of neutralizing, L. F. Kebler on, 1330
Adenoids, 376
  mouth-breathing persisting after removal of, A. H. Ketcham on, 1313
Adkins, J. E., death of, 627
Adler, G. H., death of, 390
Africa, Central, extraction and mutilation of teeth among natives of, 611
"Aging" of filings of silver-tin alloys, 641
Agostini, E. M., "Operative Dentistry *Not* Degenerating; an Answer to Dr. Jas. Truman," 775
Alabama Board of Examiners, 638
Alabama Dental Association, announcement, 635
Albrecht, M., "Originality in Dental Instruments, Mixing Cements, etc." (clinic), 463
Alcohol, rectified, removing the odor of, 1061
Alcohol and tobacco, removing the odor of from the mouth, 1060
Alcohol lamp *vs.* Bunsen burner, 953
Alexander's wax gold for repairing gold work, 1185
Alexins in saliva, R. W. Bunting on, 544
Allen, F. W., on casting process in crown and bridge work, 592
  on oral sepsis, 599
Alloying metals, chemical theory of, C. M. McCauley on, 176
Alloy for casting crowns, 1290
Alloys, aging of, 180, 909
  balancing, W. W. Atkinson on, 907
  balancing opposing physical properties of metals in, C. M. McCauley on, 178
  cut of, W. W. Atkinson on, 911
  filing and annealing in, C. M. McCauley on, 180
  G. V. Black's, W. W. Atkinson on, 908
  melting, W. W. Atkinson on, 909
  silver-tin, "aging" of filings of, J. W. McBain and R. A. Joyner on, 641
  silver-tin, J. W. McBain and R. A. Joyner on, 641
Alum, a prosthetic use of, R. N. Moore on (correspondence), 1247
  for perspiring hands, 1060
Aluminum, cast appliances, 123
  facilitating the cutting of, 247
  imparting a dull finish to, 247
Aluminum alloys, bridges of, 378
Aluminum plates, caution in the use of, 727
Alveolitis, atrophic, L. C. LeRoy on, 1095
Alveolo-dental ligament, instrumentation and systemic treatment of, A. Zentler on, 702
Amalgam, definition of, W. W. Atkinson on, 910
  silver, J. W. McBain and R. A. Joyner on, 646
  tin, J. W. McBain and R. A. Joyner on, 646
Amalgam alloy, a new, W. W. Atkinson on, 911
Amalgam alloys, dental, some thoughts on, W. W. Atkinson on, 906
Amalgam filling, polishing, 1060
Amalgam fillings, finishing, 248, 1382
  indications for, C. E. Woodbury on, 1204
  test of time in, C. M. McCauley on, 175
  R. H. Riethmueller on, 385
Amalgams containing tin, silver, and mercury, J. W. McBain and R. A. Joyner on, 649
  influence of heat on, J. W. McBain and R. A. Joyner on, 649

Amalgams, their manufacture, manipulation, and physical properties, C. M. McCauley on, 174
Ambidextrous operating, advantages of, L. J. Walker on, 464
American Dental Society of Europe, announcement, 256
American Medical Association, Section on Stomatology, announcement, 631
American Miller Memorial, announcement, 848
American Society of Orthodontists, announcement, 630
Analgesia with nitrous oxid and air, self-administered, 493
  with nitrous oxid and oxygen, C. K. Teter on, 905
"Anatomy: a Manual for Students and Practitioners," by J. F. Little, review of, 374
Anatomy, Handbook of, by J. K. Young, review of, 373
Anchorage for anterior teeth, cast, J. M. Crosby on, 444
  W. S. Payson on, 235
Anderson, C. L., "A Method for Easily and Accurately Overcoming the Difficulties of Adjusting Bridge Work on Converging Roots" (clinic), 455
André-Bonnet, J. L., "General History of Dental Surgery from Primitive Times to the Modern Epoch, Especially in France," review of, 119
Andrews, R. R., "Calcification," 47
  response on receiving of Jarvie Fellowship medal, 107
Anesthesia, acidosis following, 494
  blood pressure in, 121
  dental, nearing, 1376
  excessive use of tobacco as a complicating factor in, 946
  general, choice of anesthetic, W. H. DeFord on, 1132
  general, considerations on heated ether in dentistry for, 485
  general, nitrous oxid and oxygen, cases showing contra-indications, and points of special interest, C. K. Teter on, 898
  general, nitrous oxid and oxygen, clinical experience, C. K. Teter on, 898
  general, prolonged, produced by nitrous oxid and oxygen, A. E. Smith on, 447
  general, with gas-oxygen, observation in 2000 cases, 1180
  inhaler for nitrous oxid and oxygen, G. T. Gregg on, 355
  local, and extirpation of the pulp, attitude of the profession toward, N. C. Leonard on, 188
  local, by novocain injection, avoidance of failures in, 375
  local, causes and prophylaxis of pain arising after extraction under, 496
  local, considerations in, 1376
  local, in dentistry, with special reference to the mucous and conductive methods, by G. Fischer and R. A. Reithmueller (bibliography), 1114
  local, tropacocain for, 1289
  nitrous oxid and oxygen, 1063
  nitrous oxid and oxygen, suggestions for safe, 1187
  pressure, N. C. Leonard on, 189
  pulp, solvent for cocain in, 726
  with special reference to nitrous oxid and its sequences, 243
Anesthetic for small surgery, the office, nitrous oxid and air self-administered, 492
  pulp and dentin, Norwegian, 948
Anesthetic inhaler, W. H. DeFord on, 447
Anesthetics, The Administration of, by Unqualified Persons (editorial), 821
Anesthetics, general, can the dental surgeon use them to advantage in daily practice? W. H. DeFord on, 1126
  general, comparative effects on blood changes, 381
  general, details to be considered in the administration of, W. H. DeFord on, 1131
  use of re-breathing in the administration of, 242
Angina, diagnostic symptoms of, 728
  Ludwig's, points regarding, 382
  Vincent's, H. S. Vaughan on, 650
Angle, E. H., "Evolution of Orthodontia—Recent Developments," 853
Angle's appliances, improvement of, 609
Annealing rolled gold plate, effects of, W. W. Atkinson on, 435
Anomalies—canines and incisors with two roots, 122
  teeth at birth, 121
Antiseptics, in the combating of caries, L. F. Kebler on, 1329
Antrum of Highmore, drainage of suppurated, 495
  modern principles in treatment of empyema of, 1184
Araki, K. N., "A New System of Screw Bridge Work," 534
Arch, dental, calcification as an indicator for proper amount of expansion, V. E. Barnes on, 9
  dental, expansion of, H. A. Pullen on, 509
  dental, measurements of, G. H. Wright on, 267
  dental, normal, examination and calculation of, V. E. Barnes on, 6
  dental, symmetroscope, an apparatus for measuring the symmetry or asymmetry of, 490
Arch development, normal, V. E. Barnes on, 4
Arcoli, Giovanni, an early dentist, J. J. Walsh on, 93
Arizona Board of Dental Examiners, 1299
Arizona Dental Society, announcement of, 135
Arkansas State Dental Association, announcement, 636
Arkansas stone, water for, 1381
Army and Navy Dental Corps, status of, A. R. Melendy on, 1255
Army dental corps, B. H. Smith on, 80
Army dental surgeons, acting, new appointments of, 851
  examination for, 1079
  in state militia, E. A. Bryant on, 62
  memoranda of changes in stations of, 135, 259, 396, 508, 640, 744, 851, 971, 1079, 1191, 1300, 1388
Arsenic, prophylactic treatment in the application of, 1290
Arsenous oxid in deciduous teeth, use of, H. B. Tileston on, 202
Arteries, degeneration of, due to oral sepsis, J. Daland on, 1223
Arthritis, alveolo-dental, classification and treatment, A. Zentler on, 702
  alveolo-dental, proposed regimen in, A. Zentler on, 788
Articulation of teeth, anatomical, after vulcanization, a method of, 1066
Asepsis, a sense of, wanted, 1054
  lack of, in dental colleges, 1054
  lack of, in public dental clinics, 1055
Aseptic dentistry, M. L. Rhein on, 529
Ash, C. F., on nitrous oxid and oxygen, 936
Assistants, general office, courses for training, N. S. Hoff on, 782

Association Internationale de Perfectionnement Scientifique, announcement, 391
Athletes, method of lifting heavy weights with the teeth by, 1061
Atkinson, W. W., "Some Thoughts on Dental Amalgam Alloys, and a Discovery," 906
  "The Segmental Gold Plate," 434
Atlanta Dental College, commencement of, 837
Autoplasty, re-covering the exposed necks of teeth by, 377

Backing a porcelain facing with platinum and tipping with gold without heating the facing, L. S. Ingalls on, 230
Backings, a device for facilitating the perfect adaptation of, D. A. Rosenthal on, 456
  perfect adaptation of, D. A. Rosenthal on, 357
Bacteria of the mouth and the value of toothbrushes and tooth pastes, 128
  oral, and antiseptics, P. R. Howe on, 567
Bacteriological index of the oral cavity, F. Hecker on, 1354
Bacterium coli commune, M. M. Bettman on, 1111
Badgley, Ernest E., death of, 389
Baker, E. H., "The Natural Field of Dentistry," 694
Baker, G. T., on early treatment of malocclusion, 472
Baker, L. W., "A Reply to Dr. Wm. Bebb," 663
Ballachey, F. A., on dentifrices, 73
Baltimore College of Dental Surgery, commencement of, 840
Baltimore Medical College, Dental Department, commencement of, 959
Bands, clamp, in orthodontic treatment, gaining space for the adjustment of, 248
Banzhaf, H. L., "Secretary's Annual Report of the Dental Educational Council of America," 363
Barber, Clarence J., death of, 500
Bard, A. E., on the manipulation of gold foil, 1271
Barnes Dental College, commencement of, 841
Barnes, H., "Pure Gold Matrix Inlay, Using Ney's Soft Foil and Sweating 22-karat Gold Plates Without Investment" (clinic), 443
Barnes, V. E., "Dental Impaction and Preventive Treatment," 1
Barnes, Walter S., death of, 628
Barrows, Wm. A., death of, 1385
Bartlett, Chas. H., obituary of, 834
Bebb, W., "A Criticism of a Paper by Dr. Lawrence W. Baker Entitled 'A Preliminary Study of the Influence of the Forces of Occlusion on the Development of the Bones of the Skull,'" 170
  a reply to, by Dr. L. W. Baker, 663
Beck, H. M., on professional progress, 86
Beck, P. S., "Bridge with Posterior Cast Gold Inlay Abutments," 617
Beech creasote and its application in dental therapeutics, 1054
Belcher, W. W., on mouth hygiene, 792
  on oral hygiene and preventive dentistry, 811
  on orthodontia in its relation to pyorrhea and oral hygiene, 1168
Bell, G. G., "Grinding and Mounting a Detached-post Crown" (clinic), 453
Bellchamber, C. E., "Gold Filling" (clinic), 441
Benefactions, Two Notable (editorial), 818
Benson, C. W., "Contouring Two-piece Shell Crowns" (clinic), 453
Bettman, M. M., "Constitutional Results of Pyorrhea Alveolaris," 1110
Beust, T. von, "A Contribution to the Study of Immunity to Dental Caries," 659
  "Plaques," 316
Bicuspids, consideration in the preservation of, 726
  restoration of lingual cusp in, 613
Biddle, J. F., on oral sepsis, 1277
Bile-stained teeth, 954
Bingham, G. A., death of, 499
Birdsall, C. C., "A Method of Substantially Repairing Lower Vulcanite Plates" (clinic), 226
Bishop, G. E., "The Correct Mechanical Principles Involved in Making Clasp for Partial Plates or Removable Bridge Retention" (clinic), 459
Bite, taking the, for bridge work, 829
Black, A. D., "The Beginnings of Diseases of the Peridental Membrane and Their Prevention," 684
  on cavity preparation for gold inlays, 1370
  on expansion of a dental arch and opening of the maxillary suture, 588
Blair, Wm. E., death of, 628
Blaisdell, E. C., on oral sepsis, 601
Bliven, C. F., on early treatment of malocclusion, 474
  on oral sepsis, 600
Blood pressure in anesthesia, 121
Blowpipe, an automatic, L. E. Custer on, 462
  oxyhydrogen, S. H. McAfee on, 455
Bödecker, Carl F. W., obituary of, 1067
Bohr inlay metal as a basis in root restoration, W. E. Fribley on, 442
"Bone-growing," C. S. Case on, 281
Bones, facial, membraneous character of sutures of, H. A. Pullen on, 519
  of face and jaws, development of, by orthodontia treatment, A. H. Suggett on, 655
Books, new, E. S. Filbert (report) on, 1142
Boon, Geo. A., obituary of, 132
Bottles, glass-stoppered, for volatile substances, 615
Bowbeer, N. G., "Cast Inlays in the Deciduous Teeth" (clinic), 442
Bowman, Sands J., death of, 835, 957
Boydston, W. J., "How to Cast an Inlay When Your Casting Machine is Out of Order" (clinic), 443
  "Method of Making Porcelain-faced Shell Crowns by the Use of the Steele Facings for Bicuspids" (clinic), 454
Brain function, influence of teeth on, 949
Braithwaite, E. S., "The Mechanical and Surgical Treatment of Congenital Cleft Palate Demonstrated with Models" (clinic), 448
Bread, causal relation of, to the preservation of good health and sound teeth, if the ferments or enzymes of the wheat have performed their action, T. G. Read on, 1107
  soft, as a cause of dental caries, C. Röse on, 1217
  with special reference to causation and prevention of dental caries, 609
Bridge, an aid in taking an impression for a, 247
  gold inlay, cast in one piece, 726
  or plate, choice of, 830
  pivot, fastened to cast split ferrules, 244
  removable, N. W. Hiatt on, 456
  removable saddle, with one abutment, support for, in case of lack of a posterior abubment, 1184
  repairing a broken facing without removing a, 380
  saddle, a new, 1065
  soldered, method of adding solder in a, 381

Bridge, with posterior cast gold inlay abutment, 617
  with plumper, for restoring facial expression, E. P. Wright on, 764
Bridge attachments, cast gold inlays for, E. Hillyer on, 880
  inlays as, 1291
Bridge impression tray, for taking a bite and impression simultaneously in plaster of Paris, C. H. Woolgar on, 459
Bridge retention, removable, the special mechanical principles involved in making clasps for partial plates or, G. E. Bishop on, 459
Bridges, anterior, lingual or concealed anchorage for, C. A. Priest on, 455
  cast gold, E. Hillyer on, 882
  fixation of, with gutta-percha, 489
  for pyorrhea cases, C. J. Grieves on, 269
  gold, technique of casting, 243
  including abutments, casting in a single cast, W. H. Hayden on, 456
  inlay, and other attachments, W. O. Hulick on, 1362
  of aluminum alloys, 378
  removable, J. L. Kelly on, 457
Bridges and crowns, carbolic acid for preventing pain during the cementing of, 127
  hollow dowels for, 1187
  new method of fastening, 1053
  new method of securely fastening porcelain facings to the gold base or cap without soldering, 377
Bridge work, caution in the use of all-porcelain occlusal surfaces in, G. E. Stallman on, 955
  cavity preparation for cast inlay abutments for, C. P. Grosby on, 454
  esthetic, J. E. Dowden on, 455
  fixed, dummies for, H. J. Goslee on, 581
  removable, a new tube-and-post attachment for, H. J. Goslee on, 583
  removable, F. R. Getz on, 458
  removable, and interdental supports, F. R. Getz on, 230
  screw, a new system of, K. N. Araki on, 534
  taking the bite for, 829
  the dynamics of, E. Hillyer on, 881
  unhygienic; malpractice, 730
Brine, Lon F., death of, 133
Briner, O. W., "Porcelain *vs.* Gold; the Electrotyped Matrix for Porcelain Workers," 729
Broaches, broken, removing from root-canals, 1289
  cleaning, 247
  smooth, practical method of using in root-canal treatment, 830
Brooklyn Odontological Society, announcement, 597
Broomell, I. N., on calcification, 108
  on manipulation of gold foil, 1271
  on oral sepsis, 1274
Brophy, T. W., on mouth infections, 1265
Brown, G. V. I., on nasal deformities and dental irregularities, 323
Brown, H. C., on general anesthetics in daily dental practice, 1148
Brown, Leslie B., death of, 835
Bryant, E. A., "Dental Surgeons in State Militia" (correspondence), 62
Buccinator muscle as a factor in retention of dentures, J. L. Elphinstone on, 875
Buckley, J. P., on the question of extraction in orthodontia, 353
Bullock, Henry C., death of, 133
Bunsen burner *vs.* alcohol lamp, 953
Bunting, Russell W., "Certain Sections of the Human Jaws, Made by the Late Dr. W. D. Miller," 677
Bunting, Russell W., "Immunity and Susceptibility of the Teeth to Caries," 537
  "Secondary Calcification of the Tooth-pulp," 157
Bunting's (Dr. R. W.) tests of potassium sulfocyanate in saliva, C. F. MacDonald on, 58
Burkhart, A. P., on amalgams and cements, 214
  on crown and bridge work, 1366
Burnishers, glass, for porcelain inlays, 246
Burs, cleaning, 247
  old, using as vulcanite trimmers, 247
  preserving the sharpness of, in sterilizing, 128
  sharpening, 128
Buscho, W. A., "Pyorrhea" (clinic), 449

Cables, repairing broken, 1185
Calcific deposits in root-canals, R. W. Bunting on, 169
Calcification of teeth, R. R. Andrews on, 47
  tubular, R. W. Bunting on, 159
Calcifications, secondary, of the tooth-pulp, R. W. Bunting on, 157
Calcium in saliva, volumetric test for, P. R. Howe on, 433
Calcium and magnesium in bones and teeth in health and disease, proportions of, 831
Calculi in relation to pyorrhea alveolaris, W. F. Spies on, 993
Calculus, salivary, deposits of, A. D. Black on, 685
  salivary, D. H. Squires on, 887
  serumal and salivary, Metchnikoff's lactic ferment food for, A. Zentler on, 788
  serumal, deposits of, A. D. Black on, 686
California Board of Examiners, 1299
Callahan, J. R., on root-canal filling, 70
Campbell, D. D., on filling root-canals with an improved paraffin compound, 1159
Campbell, W. O., "Fountain Tooth-brush" (clinic), 445
Canadian Dental Society and Ontario Dental Association, union meeting, 133
Canine, the, as the criterion tooth in orthodontia, 495
Canines and incisors with two roots, 122
Capon, F. J., "Porcelain" (clinic), 451
Capon, W. A., "Porcelain Crown, Platinum Frame, Porcelain Face" (clinic), 362
  "Porcelain Restoration of Incisal Edges" (clinic), 451
Capping vital pulps, 382
Carbolic acid for preventing pain during the cementing of crowns and bridges, 127
Carbolic acid burns, 381
Carbonates in saliva, detection of, P. R. Howe on, 432
Carborundum wheels, paraffin treatment for, 955
  restoring clogged, 952
Carcinoma, oral, factors in etiology of, 493
Card index system for indexing contributions to dental magazines, E. S. Filbert on, 357
Cardiac disease due to oral infection, M. L. Rhein on, 1242
Caries, 486
  accelerating and inhibiting agents in oral secretions, P. R. Howe on, 567
  antiseptics in the combating of, L. F. Kebler on, 1329
  causes of variations in susceptibility to, R. W. Bunting on, 538
  contribution to the study of immunity to, T. von Beust on, 659
  early theories regarding, R. W. Bunting on, 537
  experimental, as produced by different breads, T. G. Read on, 1108

- Caries, experiments and observations on bread, with special reference to causation and prevention of, 609
  - foods afforded the bacteria which cause, R. W. Bunting on, 540
  - fundamental causes of, C. Röse on, 1214
  - immune areas, J. Truman on, 414
  - immunity and susceptibility of teeth to, R. W. Bunting on, 537
  - influences which help or hinder the growth of the bacteria of, R. W. Bunting on, 539
  - interproximal, and the interproximal space, 611
  - in the stone age, 1057
  - measures for enforcing natural selection advocated for the eradication of, C. Röse on, 1218
  - micro-organisms in, R. W. Bunting on, 539
  - "panmixia" as a cause of, C. Röse on, 1216
  - pathology of, and extension for prevention, W. R. Clack on, 26
  - prevalence of, L. F. Kebler on, 1328
  - produced by child's "comforter," 379
  - prophylaxis during pregnancy, F. H. Skinner on, 45
  - self-cleansing factors in the oral cavity and, 832
  - soft bread as a cause of, C. Röse on, 1217
  - soft drinking-water as a cause of, C. Röse on, 1218
  - sugar as a cause of, C. Röse on, 1218
  - wheat-flour, poor, as a cause of, 1107
- Caries and pyorrhea alveolaris, initial causes of, F. H. Skinner on, 39
- Carious fermentative processes, factors inhibiting or accelerating, P. R. Howe on, 567
- Carious vital teeth, antiseptic treatment with tincture of iodin, 614
- Carlton, Franklin S., death of, 835
- Carr, I. N., "Chronic Abscesses" (clinic), 446
- Carson, E. M., "A Cast Crown" (clinic), 453
- Case, C. S., "Answer to Dr. Dewey's Discussion," 1008
  - "The Question of Extraction in Orthodontia," 137, 276
- Case abrasive disk, some practical uses of the, G. W. Pringle on, 232
- Cassidy, J. S., "The Pioneer Women Dentists" (correspondence), 206
  - on tooth-staining properties of various colored dentifrices, 329
- Cast aluminum appliances, 123
- Cast base, hollow gold shell crown with, for badly decayed posterior teeth, 616
- Cast crown, E. M. Carson on, 453
- Cast gold crowns, H. J. Goslee on, 580
- Cast gold inlay, wax patterns for, C. S. Van Horn on, 973
- Cast gold inlay abutment, posterior bridge with, 617
- Cast gold inlay bridge in one piece, 726
- Cast gold inlay patterns, removing, 1188
- Cast gold inlays, anchorage of, 728
  - shrinkage in, F. S. Meyer on, 758
  - *vs.* gold foil fillings, C. E. Woodbury on, 1203
  - T. P. Hinman on, 203
- Cast inlay, manipulating the sprue in wax model, 381
- Cast inlays, preparation of cavities for, C. H. Hebble on, 442
- Cast jointed Logan crown, 496
- Cast metal appliances, 123
- Cast porcelain-faced crown, F. S. Ford on, 232
- Casting, improper insertion of sprue wire in, C. S. Van Horn on, 892
- Casting and the Taggart-Boynton suit, F. L. Davenport on, 1042
- Casting an inlay when casting machine is out of order, W. J. Boydston on, 443
- Casting bridges, including abutments, in a single cast, W. H. Hayden on, 456
- Casting failures and remedies, C. S. Van Horn on, 890
- Casting gold bridges, technique of, 243
- Casting gold inlays, investments and investing, C. S. Van Horn on, 893
- Casting large pieces, H. J. Goslee on, 584
- Casting of porcelain, F. S. Weld on, 233
- Casting outfit, a simple and reliable, C. S. Starkweather on, 442
- Casting process, extent to which it may be advantageously applied in crown and bridge work, H. J. Goslee on, 575
  - some opportunities in prosthetic dentistry afforded by, E. Hillyer on, 879
- Casting specialties in crown and bridge work, J. G. Reid on, 453
- Casting under steam pressure developed in the vulcanizer, 251
- Casting with the aid of a vacuum cleaner, I. W. Copeland on, 465
- Castings in prosthetic work, 1290
- Casts, plaster, mending broken, L. S. Ingalls on, 231
- Cavities, approximal, preparing for porcelain inlays, 248
  - in teeth with vital pulps, lining deep-seated, A. E. Preston on, 227
  - sterilization of, and pulp exposure, N. C. Leonard on, 189
- Cavity margins, small stones for preparing, 494
- Cavity preparation, an illustrative pinhead, J. Truman on, 434
  - by extension for prevention, W. R. Clack on, 31
  - for cast gold inlays, T. P. Hinman on, 203
  - for casting inlays, C. H. Hebble on, 442
  - for the gold inlay, J. V. Conzett on, 1321
  - steps in, W. R. Clack on, 37
  - J. P. Erwin on, 402
- Cavity varnish for the prevention of thermal shock, A. H. Merritt on, 228
- Celluloid, sanitary matrix bands of transparent, E. Jacob on, 499
- Celluloid band and matrix clamp, G. H. Shannon on, 229
- Celluloid plates in dental practice, uses of, 379
- Cellulose wadding, 381
- Cement, hardened silicate or other, removing from a roughened glass slab, 1185
  - oxyphosphate, as a root-filling, H. F. Gleason on, 1339
  - preventing adhesion of, to instruments, 952
  - silicate, filling instruments for inserting without risk of subsequent discoloration, 386
  - silicate, W. D. Tracy on, 885
- Cement fillings, silicate, practical hints for, 724
  - silicate, pure nickel instruments for inserting, 381
- Cements, glass packers for, M. Albrecht on, 463
  - glass spatulas for mixing, M. Albrecht on, 463
- Cementation of inlays, 1291
- Cementing gold inlays to place, T. P. Hinman on, 205
- Cements, testing, C. M. McCauley on, 186
- Cementum, formation of, R. R. Andrews on, 53
  - formation of, I. N. Broomell on, 109
- Chancres of the lip, from kissing, an epidemic of, 123
- Chapin A. Harris Memorial Fund, announcement, 501
- Charters, W. J., "Pyorrhea, Using Good's Selection of Younger's Instruments" (clinic), 445

Cheeks, restoring fulness of, in plate work, J. L. Elphinstone on, 877
Chewing-gum as a mouth cleanser, 122
Chicago College of Dental Surgery, announcement, 634
Chicago Dental Society, announcement, 134, 1297
Child, the unborn, care of tooth development in, H. B. Tileston on, 197
Children, dental disease in, 485
  little, care of the mouths and teeth of, H. B. Tileston on, 197
  ulcerous stomatitis in, 950
Children's Aid Society, dental clinics of, A. H. Merritt on (correspondence), 1338
Children's teeth, surgical pulp removal in, N. C. Leonard on, 192
Chinese dentistry, J. J. Walsh on, 90
Cholecystitis and cholelithiasis, due to oral sepsis, J. Daland on, 1224
Chlorids in saliva, volumetric determination of, P. R. Howe on, 432
Cincinnati College of Dental Surgery, commencement of, 837
Clack, W. R., "Review of a Paper by Dr. P. B. McCullough Entitled 'Wherein Clinical Evidence is At Variance with Extension for Prevention,' " 25
  on secondary calcification of the tooth-pulp, 211
Clamp, matrix, and celluloid bands, G. H. Shannon on, 229
Clamp bands in orthodontia, cementation of, 830
  in orthodontia, securing separation for the adjustment of, 615
  in orthodontic treatment, gaining space for the adjustment of, 248
Clamps, rubber dam, and ligatures, and infection, 949
Clark, G. E., death of, 958
Clasps for partial plates, making, G. E. Bishop on, 459
  making perfectly fitting, 128
Clawson, W. M., on root-canal filling, 73
Cleft palate, an operation for closure of, by gradual pressure, 1058
  closure by pressure, 1185
  congenital, mechanical and surgical treatment, E. S. Braithwaite on, 448
  eighty-one consecutive cases of, treated by operation, 1058
  method of promoting more favorable prognostication for, by use of hyperemia induced by suction plates, H. J. Kauffer on, 448
  speech defects in, 125
  surgical treatment of, 1290
Clendenen, Robert R., death of, 255
Clifton, R. H., "in memoriam" resolutions, 255
Clinics, dental, in Manila, L. Ottofy on, 1245
  dental, of the Children's Aid Society, New York city, A. H. Merritt on (correspondence), 1338
Cobb, F. C., on nasal deformities and dental irregularities, 320
Cocain in pulp anesthesia, solvent for, 726
  stable solution of, 380
Cocain habit acquired after dental treatment, 1185
College of Dental and Oral Surgery of New York, commencement of, 961
College of Physicians and Surgeons, commencement of, 959
Colleges, dental, J. G. Sharp on, 1018
  lack of asepsis in, 1054
Colorado Board of Examiners, 1079, 1387
Colorado College of Dental Surgery, commencement of, 959
Colorado State Dental Association, announcement, 636
Coloring agents for mouth-washes, experiments with, W. H. O. McGehee on, 292
Colyer, J. F., "Dental Caries in Its Relation to General Medicine" (bibliography), 482
"Comforter" caries, 379
Concrescence of teeth, contribution to the study of, 1379
Connecticut Dental Commissioners, 637
Connecticut State Dental Association, announcement, 392
  proceedings of, 930
Contact points, procedures in building and maintaining proper, A. D. Black on, 690
  C. N. Johnson on, 55
Contact points and interproximal caries, 611
Conzett, J. V., "Something on Cavity Preparation for the Gold Inlay," 1321
  on extension for prevention, 75
Cook, C. D., death of, 1385
Cook, Henry M., death of, 133
Cook, S. B., on cast gold inlays, 219
  on surgery of the pulp and periapical infection, 219
Cooke, A. B., on effects upon the teeth of administration of iron, 1058
Cooke, Edgar C., death of, 835
Coolidge, John R., death of, 733
Copeland, I. W., "Helpful Hints for the Use of a Vacuum Cleaner" (clinic), 465
Copeland, Rutledge R., death of, 732
Corcoran, J. C., "in memoriam" resolutions, 389
Coriell, L. D., "Oral Prophylaxis and Pyorrhea" (clinic), 359
Cork stoppers, rendering impermeable, 248
Corley, J. P., "The Adolescence of the Dental Profession," 220
  on the care of the mouths and teeth of little children, 217
Correction of Dr. M. L. Rhein's formula for scientific treatment of root-canals, 239
Corundum, 613
Coston, W. A., "Porcelain Jacket Crown" (clinic), 452
Cotton holder, non-sterilized, syphilitic infection transmitted by, 727
Courtwright, B. A., on wax patterns, 1047
Crane, S. LeG., death of, 390
Crawford, Joseph D., death of, 835
Creasote, beechwood, and its application in dental therapeutics, 1054
Crosby, J. M., "Cast Anchorage for Anterior Teeth" (clinic), 444
  "Restoration of a Fractured Root" (clinic), 444
Crouse, J. N., on amalgams, 215
Crowe, Joseph P., death of, 390
Crown, a cast, E. M. Carson on, 453
  an inlay, W. R. Clack on, 34
  banded, soldering floors and cusps to, 381
  cast gold, E. Hillyer on, 880
  cast porcelain-faced, F. S. Ford on, 232
  detached-post, grinding and mounting, G. G. Bell on, 453
  for restoration of posterior teeth, combination of diatoric tooth and metal casting for, A. O. Plant on, 453
  gold, repair of broken surface, 615
  gold shell, and its shortcomings, E. Hillyer on, 880
  gold shell, method of repairing, 248
  hollow gold shell, with cast base for badly decayed posterior teeth, 616
  ideal bicuspid, made by using a porcelain veneering over a gold shell crown, W. H. Moseley on, 452
  Logan, cast jointed, 496

Crown, porcelain, platinum frame, porcelain face, W. A. Capon on, 362
  porcelain, removable band for, J. A. Heaton on, 452
  Richmond, obtaining a perfect joint between facing and backing in, 494
  taking impression of root for, 1378
  the locket, 242
Crown and bridge teeth, advantages of cementation of, H. J. Goslee on, 578
Crown and bridge work, construction of a hood, 1290
  cosmetic appearance and strength afforded by casting, H. J. Goslee on, 576
  extent to which the casting process may be advantageously applied, H. J. Goslee on, 576
  high-fusing metals in the initial steps of, S. H. McAfee on, 455
  injudiciously applied, Dr. Hunter's just condemnation of, M. L. Rhein on, 532
  inlays as attachments for, 1291
  removable, A. W. Jarman on, 457
  requirements for a hood, 1291
  some casting specialties in, J. G. Reid on, 453
  W. O. Hulick on, 1357
Crown and root, fractured, restoration of, 955
Crown or band, fitting of, H. F. Gleason on, 584
  preparation of, K. N. Araki on, 535
Crown pin, repairing a broken Richmond, 129
Crowns, abutment shell, strengthening, W. S. Rose on, 229
  alloy for casting, 1290
  all-porcelain, suggestion for making cast copes for, C. S. Van Horn on, 893
  banded, importance of perfect adaptation of (editorial note to correspondence), 584
  carving cusps for swaged gold shell, 127
  cast gold, H. J. Goslee on, 580
  contouring two-piece shell, C. W. Benson on, 453
  detached-post, improved method of fitting to a root, 249
  dowels for soldering, 1062
  gold, and clasps, partial lower denture with, E. A. Schillinger on, 227
  gold, repairing, 127
  gold, to remove, L. Englander on, 131
  porcelain, building up, 127
  porcelain, cast bases for, E. Hillyer on, 881
  porcelain-faced, A. W. Twigger on, 226
  porcelain-faced shell, method of making by the use of Steele facings for bicuspids, W. J. Boydston on, 454
  porcelain jacket, a case of dental and facial restoration, by, L. A. Hawkes on, 21
  porcelain jacket, preparation, manipulation and backing of, H. J. Frank on, 452
  porcelain jacket, W. A. Coston on, 452
  porcelain, preparation of root for, C. P. Grosby on, 454
  repair of broken dowels of, 1292
  single all-porcelain, with cast base, H. J. Goslee on, 579
  various, with reference to esthetic and resistive principles, L. E. Palmer on, 227
Crowns and bridges, carbolic acid for preventing pain during the cementing of, 127
  hollow dowels for, 1187
  new method of fastening, 1053
  new method of securely fastening porcelain facings to the gold base or cap without soldering, 377
  some dowel and hollow metal. showing correct principles in construction, T. E. Weeks on, 358
Crowns and gum irritation, C. N. Johnson on, 54
Crown work, roughening posts or tubes before cementing in root-canals, 495
  swaging a cap for a root, 831
Cryer, M. H., on mouth infections, 1265
  on the question of extraction in orthodontia, 331
Cupit, G. W., "A Case of Restoration of the Superior Maxillary Bone" (clinic), 361
Curriculum, dental, in Germany, N. S. Jenkins on, 1227
  of the College of Dental Surgery of the University of Michigan, N. H. Hoff on, 1024
Custer, L. E., "New Laboratory Appliances" (clinic), 462
Cyst wall, breaking-up of a, R. Eckermann on, 1007
Cysts, dentigerous, ovarian, 1379
  dentigerous, and complications, M. N. Federspiel on, 1307

Daland, J., "Oral Sepsis from the Physician's Standpoint," 1221
Dameron, E. P., "Diatoric Teeth in Crown and Bridge Work" (clinic), 453
Darby, E. T., on effects upon the teeth of the administration of iron, 1038
  on filling root-canals with an improved paraffin compound, 1151
Davenport, F. L., "President's Address" (Susquehanna Dental Association of Pennsylvania), 1041
Davis, Samuel E., obituary of, 731
D.D.S. degree, is the dental profession prepared to abandon the? J. Truman on, 672
  recognition of, at home and abroad, J. Truman on, 673
Deciduous dentition, defective, V. E. Barnes on, 1
Deciduous molar, impacted, extraction of, 1064
Deciduous teeth, use of arsenous oxid in, H. B. Tileston on, 202
X-ray diagnosis of disorders in, J. J. Moffitt on, 869
DeFord, W. H., "Anesthetic Inhaler" (clinic), 447
  "General Anesthetics—Can the Dental Surgeon Use Them to Advantage in Daily Practice?" 1126
Deformities of the nasal respiratory tract, coincident with dental irregularities, G. H. Wright on, 261
Delhommer, C. C., death of, 255
DeLong, W. D., on general anesthetics in daily dental practice, 1147
Delta Sigma Delta Fraternity, announcement, 965
"Dental Caries and Oral Sepsis, Prevention of," by H. B. Pickerill, review of, 479
"Dental Caries in Its Relation to General Medicine," by J. F. Colyer, review of, 482
Dental Educational Council of America, Secretary's annual report, 363
Dental Faculties Association of American Universities, proceedings of, 1017
Dental Faculties Association of American Universities *vs.* the National Association of Dental Faculties, B. Holly Smith on, 81
Dental Institute (New) at Berlin (editorial), 1284
Dental Instructors, The Training of (editorial), 1050
Dental Nurse, The (editorial), 715
Dental profession's attitude toward educational progress—see editorial, 943
Dental service and number of population proportion of, James Truman on, 674

Dental Society of the State of New York, announcement, 257
  clinics, 224
  proceedings of, 97, 912, 1036, 1151
Dentifrices, classification of, W. H. O. McGehee on, 290
  coloring agents in, W. H. O. McGehee on, 290
  danger of coloring agents in, L. F. Kebler on, 1331
  experimental study of the tooth-staining properties of various colored, W. H. O. McGehee on, 289
  proprietary, colored, W. H. O. McGehee on, 292
  F. A. Ballachey on. 73
  L. F. Kebler on, 1328
Dentin, formation of, R. R. Andrews on, 50
  formation of, I. N. Broomell on, 109
  hypersensitive, ether spray for desensitizing, E. F. Loeffler on, 448
  secondary, R. W. Bunting on, 163
  secondary, W. R. Clack on, 33
  sensitive. excavating by the aid of nitrous oxid and oxygen, G. T. Gregg on, 355
Dentin anesthetic, Norwegian, 948
Dentistry, modern, in Germany, N. S. Jenkins on, 1225
  the natural field of, E. H. Baker on, 694
  versus medicine, E. H. Baker on, 694
Denture, artificial, a flexible lower, W. H. Mitchell on, 234
  ill-fitting, sarcoma due to, 248
  partial lower, with crowns and clasps, E. A. Schillinger on, 227
  vulcanite, flasking, 1186
  vulcanite, re-attaching one or more teeth to, 494
  vulcanite, replacing a tooth in, 1291
Dentures, artificial, buccal flanges as an aid in retaining, J. L. Elphinstone on, 875
  buccinator muscle, as a factor in retention of, J. L. Elphinstone on, 875
  cast gold, E. Hillyer on, 882
  cast, making wax model for, W. S. Rose on, 229
  cast reinforcements for supporting and retaining, E. C. Hoffman on, 461
  for pyorrheal cases, C. J. Grieves on, 269
  settling of, into gums, compensation for, J. L. Elphinstone on, 879
  technique of various steps in the construction of, S. C. G. Watkins on, 460
  vulcanite, 1185
  vulcanite, obtaining smooth palatal surface in, 952
  vulcanite, repairing, 495
"Dermoid teeth," or teeth developed in teratomata, 1379
Deterioration, dental, fundamental causes of, C. Röse on, 1214
Development, of skull, influence of the teeth on, 948
  oral, in the progeny, influenced by the buccal tissues during pregnancy, A. Zentler on, 1119
Devitalization and root-canal treatment, 1181
Devitalization of pulp, prophylactic treatment in application of arsenic, 1290
  with salvarsan, 1289
Dewey, M., "A Reply Which is Not a Reply to my Discussion of Dr. Case's Paper" (correspondence), 1337
  on the question of extraction in orthodontia, 341
Diagnosis, correct, the dentist's grave responsibility in regard to, M. N. Federspiel on, 1310
Diagnosis, X-ray, Sinclair Tousey on, 232
Diagnosis and treatment of pathologic conditions of the teeth and jaws, imperfections in, R. H. Ivy on, 272, 724
Diatoric teeth in crown and bridge work, E. P. Dameron on, 453
Diet during pregnancy, H. B. Tileston on, 198
  in relation to dental caries, R. W. Bunting on, 540
  of the Egyptians, influence of, on their teeth, J. J. Walsh on, 89
Diet and care after birth of child, H. B. Tileston on, 199
Digestive disorders, influence of oral sepsis on, 610
Discoloration, blue-black, of teeth, due to potassium permanganate, 1055
  of teeth caused by silver nitrate, removing, 381
  of tooth structure caused by various drugs, W. H. O. McGehee on, 289
Discussion on "(I) A Group of Deformities of the Nasal Respiratory Tract Coincident with Dental Irregularities. (II) A New Instrument for Comparative Measurements, Demonstrating Changes in Nasal Fossæ when Readjusting the Maxillary Arch," 319
  on "Amalgams: Their Manufacture, Manipulation, and Physical Properties. Cements: Their Manipulation and Physical Properties," 213
  on "An Experimental Study of the Tooth-staining Properties of Various Colored Dentifrices," 329
  on "Atrophic Alveolitis," 1161
  on "Calcification," 108
  on "Cast Gold Inlays," 219
  on "Crown and Bridge Work," 1363
  on "Dental Impaction and Preventive Treatment," 63
  on "Effects upon the Teeth of the Administration of Iron, Acids, etc., and the Precautions Taken by Physicians to Avoid Injury to the Enamel," 1036
  on "Expansion of the Dental Arch and Opening of the Maxillary Suture," 585
  on "Filling Root-canals with an Improved Paraffin Compound," 1151
  on "General Anesthetics—Can the Dental Surgeon Use Them to Advantage in Daily Practice?" 1145
  on "How Shall the Profession Meet Its New Obligations Resulting from Its Propaganda for Popular Education in Oral Hygiene and Preventive Dentistry," 799
  on "Manipulation of Gold Foil," 1268
  on "Mistakes, Common and Uncommon," 70
  on "Mouth Infections," 1260
  on "Nitrous Oxid and Oxygen as a General Anesthetic, and Its Use in Dentistry," 931
  on "Oral Sepsis," 596
  on "Oral Sepsis from a Physician's Standpoint," 1274
  on "Orthodontia in Its Relation to Pyorrhea and Oral Hygiene," 1166
  on "Pyorrhea and Prophylaxis," 97
  on "Report of Committee on Practice" (Dental Society of the State of New York), 917
  on "Review of a Paper by Dr. P. B. McCullough Entitled 'Wherein Clinical Evidence is At Variance with Extension for Prevention,'" 75
  on "Secondary Calcification of the Tooth-pulp," 207
  on "Something About Cavity Preparation for the Gold Inlay," 1367

Discussion on "Surgery of the Pulp and Its Relation to Periapical Infection," 218
  on "The Advantages of Early Treatment in Malocclusion," 468
  on "The Beginnings of Diseases of the Peridental Membrane and Their Prevention," 707
  on "The Care of the Mouths and Teeth of Little Children," 216
  on "The Extent to Which the Casting Process May be Advantageously Applied to Crown and Bridge Work," 592
  on "The Necessity and the Training of a Prophylactic Assistant," 325
  on "The Question of Extraction in Orthodontia," 331
  on "The Wax Pattern: A Technique, Together with Appliances, etc., for Its Execution," 1044
  on "Ways and Means of Advancing the Cause of Mouth Hygiene in Such a Way as to Benefit the Public and the Profession," 790
  on "What the Government is Doing to Prevent Diseases," 1258
Disinfecting a tooth with a dead pulp, method of, 128
Disinfecting the office and waiting-room by formaldehyd, 250
Disk, Case abrasive, some practical uses of, G. W. Pringle on, 232
Dispensaries, dental, in various cities, H. L. Wheeler on, 771
Dispensary, movable free dental, 953
Donnegan, E. J., on atrophic alveolitis, 1161
Dowden, J. E., "Esthetic Bridge Work" (clinic), 455
Dowels, hollow, for crowns and bridges, 1187
  in crowns, repair of broken, 1292
  soldering, for crowns, 1062
Doxtater, L. W., "Treatment of Chronic Alveolar Abscess with Fistula Discharging on the Face," 669
Drake University, College of Dentistry, commencement of, 963
DuBois, Ezekiel, death of, 389
Dummies for fixed bridge work, H. J. Goslee on, 581
Dunning, W. B., on effects upon the teeth of the administration of iron, 1040
  on filling root-canals with an improved paraffin compound, 1155

Eames, G. F., "Pyorrhea Treatment with Instruments of the Clinician's Own Design" (clinic), 225
Earwax, toothache due to, 951
Eastern Dental Society of the City of New York, announcement, 258, 971, 1386
Eckermann, Ragnar, "The Breaking-up of a Cyst Wall," 1007
Education, dental and medical, in diagnosis and treatment of pathological conditions of teeth and jaws, 724
  dental, J. G. Sharp on, 1018
  preliminary, evaluation of certificates of, E. C. Kirk on, 1022
  preliminary standard of, J. Truman on, 675
Educational (Dental) Council of America, secretary's annual report, 363
Educational council, organization of an, J. G. Sharp on, 1019
Educational Danger (An) (editorial), 370
Educational requirements for dentists, in Germany, N. S. Jenkins on, 1227
  of dentistry, modern, B. H. Smith on, 80
Egypt, medicine in, J. J. Walsh on, 87
Egyptians, ancient, dental prescriptions of, J. J. Walsh on, 90
  dentistry poorly authenticated among the, J. J. Walsh on, 88
  diet of, influence of, on their teeth, J. J. Walsh on, 89
Electric current, diagnosis of diseases of pulp by, 1186
Electric heating, Westinghouse, its application to dentistry, Dewey D. Smith on, 464
Elevators, dental, theory and practice of, 828
Elliott, M. F., death of, 1384
Ellis, W. H., on expansion of dental arch and opening of maxillary suture, 586
Elphinstone, J. L., "Buccal Flanges as an Aid in Retaining Dentures," 875
  "How to Prevent Fractures of Gum Sections," 427
Emery, Joseph S., death of, 835
Empyema of antrum of Highmore, drainage in, 495
  modern principles in treatment of, 1184
  of maxillary antrum and subperiosteal abscess, differential diagnosis of, M. N. Federspiel on, 1303
Enamel, chalky, paraffin treatment of, 1384
  treatment of white spots in, 949
  vascularity of, T. von Beust on, 660
Enamel calcification, I. N. Broomell on, 108
Enamel cuticle, histological and embryological studies of, 829
  I. N. Broomell on, 109
Enamel formation, R. R. Andrews on, 48
Enamel organ of a tooth-germ, dental abnormalities as explained by abnormal development of, R. C. Osburn on, 1201
Engine belts, bumpy, 1381
Engines, dental, lubricating oil for, 494
Erosions, sensitive, obtunding permanently, A. G. Lansing on, 224
Eruption, some notes on dates of, in 4850 children under twelve years of age, 825
Erwin, J. P., "Excavation for Preservation: A Reply to Dr. W. R. Clack," 401
Erwin, R. M., on general anesthetics in daily dental practice, 1148
Essig, Norman S., "Prosthetic Dentistry of Today and Its Possibilities," 422
Ether, heated, in general anesthesia in dentistry, considerations on, 485
Ether spray for desensitizing hypersensitive dentin, E. F. Loeffler on, 448
Etruscans, dentistry among the, J. J. Walsh on, 90
Eustachius (Bartolommeo), an early dentist, J. J. Walsh on, 94
Euthenics, experimental oral, J. E. W. Wallin on, 404, 545
Evans Museum and Institute—see editorial, 820
Ervin, J. W., death of, 1384
Examination of dentists for the U. S. Army, 260
Excavation for preservation: a reply to Dr. W. R. Clack, by J. P. Erwin, 401
Expansion arch, from its early to present form, E. H. Angle on, 853
  improvement of, 609, 856
  use of vertical tubes in, 947
  H. A. Pullen on, 358
Expansion of arch: possibilities of development following, H. A. Pullen on, 509, 524
Expansion of arches, beneficial results upon development of internal face, H. A. Pullen on, 514
"Extension for prevention," as a catch phrase, J. Truman on, 413

"Extension for prevention," in cavity preparation for gold inlays, J. V. Conzett on, 1324
  Dr. Kirk's, Dr. McCullough's, and Dr. Clack's views on, J. Truman on, 414
  J. P. Erwin on, 403
  review of a paper entitled "Wherein Clinical Evidence is At Variance with Extension for Prevention," by W. R. Clack, 25
Extraction and mutilation of teeth among natives of Central Africa, 611
Extraction, difficult, five types of, and how it may be overcome, 1181
  in orthodontia, the question of, C. S. Case on, 137, 276
  in orthodontia, the question of, in answer to Dr. Dewey's discussion, C. S. Case on, 1108
  of hollow upper first molars, 1182
  of hollow upper incisor roots, 1183
  of lower bicuspid roots, 1181
  of lower third molars, 1182
  of palatal root of upper first molars, 1183
  relieving pain after, 247
  rules for, in orthodontia, as applied to Angle's classification, C. S. Case on, 156
  under local anesthesia, causes and prophylaxis of pain arising after, 496
  unnecessary for correction of malocclusion, J. L. Young on, 231
  with reference to special points of instrumentation, A. Hall on, 449
Extractions, arresting hemorrhage after, 1061
  by Giovanni Arcoli, J. J. Walsh on, 94
  mouth-wash after, 1061
  theory and practice of dental elevators, 828
Exudates, purulent and non-purulent, M. L. Rhein on, 1240
Eye, influence of maxillary changes on the, G. H. Wright on, 266

FABER, F. B., death of, 1385
Face, internal and external, expansion of dental arch and opening of maxillary suture in relation to development of, H. A. Pullen on, 509
  internal, normal structure of, H. A. Pullen on, 509
  orthopedia of the, and orthodontia, V. H. Jackson on, 357
Facial and dental restoration by porcelain jacket crowns, a case of, L. A. Hawkes on, 21
Facing, backing a porcelain, with platinum, and tipping with gold without heating the facing, L. S. Ingalls on, 230
  broken, repairing without removing a bridge, 380
Facing and backing in a Richmond crown, obtaining a perfect joint between, 494
Facings, in crown and bridge work, advantages of all-porcelain teeth over, H. J. Goslee on, 577
  soldering with the least chance of checking, D. A. Rosenthal on, 357, 456
  Steele, for bicuspids, method of making porcelain-faced shell crowns by the use of, W. J. Boydston on, 454
Farrington, Fred L., death of, 628
Fatigue during dental work, J. R. Callahan on, 72
Fauchard, Pierre, J. J. Walsh on, 95
Fauntleroy, T. T., death of, 1385
Federspiel, M. N., "A Clinical Review of Certain Pathological Phases Concerning the Maxillary Bones," 1301
Fees, dental, necessity for adequate, M. L. Rhein on, 530
Fenchel, A., "Metallurgy: A Text-book for Workers in the Metal Industries" (bibliography), 943
Ferris, H. C., on the question of extraction in orthodontia, 347
  "Report of Committee on Scientific Research" (N. D. A.), 1352
Ferrules, cast split, pivot bridge fastened to, 244
"Festina Lente!" (editorial), 1280
Fifth District (N. Y.) Dental Society, announcement, 394
Fifth International Dental Congress, publication of Transactions of, 133
Filbert, E. S., "Card Index System for Indexing Contributions to the Dental Magazines" (clinic), 357
  "Report of Committee on Dental Science and Literature" (Pennsylvania State Dental Society), 1138
  on atrophic alveolitis, 1162
Files, cleaning, 247
Filling, gold, finishing a, 952
  gold, C. E. Bellchamber on, 441
  good temporary, 248
  malleted gold foil, *vs.* the cast gold inlay, J. V. Conzett on, 1321
  polishing, protecting soft tissues in, 952
  repairing an old, making gold foil adhere to filling, 952
Filling a cavity at bifurcation of root, method of, 1185
Filling clinic, concerted gold, 441
Filling material, gold as, G. S. Junkerman on, 419
  temporary stopping as a, 1060
  temporary stopping, especially fitted for hypersensitive cavities, 1061
Filling materials, selection of, G. S. Junkerman on, 419
Fillings, amalgam, finishing, 248, 1382
  amalgam, indications for, C. E. Woodbury on, 1204
  amalgam, R. H. Riethmueller on, 385
  burnished gold, O. B. Richards on, 362
  cohesive gold, C. E. Woodbury on, 1204
  gold, by Giovanni Arcoli, J. J. Walsh on, 94
  gold foil, indications for, C. E. Woodbury on, 1203
  gold foil *vs.* cast gold inlays, C. E. Woodbury on, 1203
  gold *vs.* inlay restorations, C. S. Van Horn on, 974
  inserting temporary gutta-percha, 382
  plastic, making ring matrices for, 493
  polishing with sandpaper disks, 494
  silicate cement, practical hints for, 724
Finley, M. F., "Orthodontia Models" (clinic), 444
Fischer, G., and R. E. Riethmueller, "Local Anesthesia in Dentistry, with Special Reference to the Mucous and Conductive Methods" (bibliography), 1174
Fischler, Barnard, "Hollow Gold Shell Crown with Cast Base for Badly Decayed Posterior Teeth," 616
Fistula discharging on face, treatment of chronic alveolar abscess with, L. W. Doxtater on, 669
  naso-oral, plastic operation for, 130
Flanagan, A. J., on professional progress, 85
Flanges, buccal, as an aid in retaining dentures, J. L. Elphinstone on, 875
Flask, closing the, in making a vulcanite denture, 831
Fletcherism, untoward facts regarding, 245
Florida Board of Examiners, 637
Flux in soldering, potassium cyanid as a, 247

Fones, A. C., "The Necessity for and Training of a Prophylactic Assistant," 284
  on nitrous oxid and oxygen, 935
  on oral hygiene and preventive dentistry, 802
  on oral sepsis, 599
Foods in relation to dental caries, R. W. Bunting on, 540
Ford, F. S., "Cast Porcelain-faced Crown" (clinic), 232
Formaldehyd, disinfecting the office and waiting-room by, 250
Formalin for obtunding sensitive erosions permanently, A. G. Lansing on, 224
Formocresol, relieving pain due to application of, 952
Forsyth Dental Infirmary for Children—see editorial, 818
Fracture of lower jaw, case of, diagnosed only by means of the X ray, 618
Fractured crown and root, restoration of, 955
Fractures of the jaw, hints on treatment of, 953
  of the mandible, treatment of, 946
Frank, H. J., "Preparation, Manipulation, and Baking of Porcelain Jacket Crown" (clinic), 452
Free Dental Dispensary opened at Wilkes-Barre, Pa., 1076
Freeman, Samuel A., obituary of, 388
Frees, Jacob H., death of, 1384
Fribley, W. E., "Root Restoration, Using Bohr Inlay Metal as a Basis" (clinic), 442
Friesell, H. E., "Report of Committee on President's Address" (Pennsylvania State Dental Society), 1273
  on dental education, 84
Fruth, O. J., "Method of Making a Hollow Gold Inlay (clinic), 443
Fundenberg, W. H., "President's Address" (Pennsylvania State Dental Society), 1135
Fusion of teeth, 1379

Gagging during impression-taking, prevention of, 1063
Gale, Hammett X., death of, 133
Gallie, D. M., on amalgams and cements, 213
Georgetown University, Dental Department, commencement of, 1071
George Washington University, Dental Department, commencement of, 1068
Germany, modern dentistry in, N. S. Jenkins on, 1225
  status of American dentists in, N. S. Jenkins on, 1229
Getz, F. R., "Removable Bridge Work and Interdental Supports" (clinic), 230
  "Some Utilities for General Practice, with Special Reference to Removable Bridge Work and Interdental Supports" (clinic), 458
Gilbert, Wm. H., notice of death of, 499
  obituary of, 619
Gilding without galvanic battery, 495
Gillett, H. W., on calcification, 109
Gingivitis, interstitial, L. C. LeRoy on, 1100
Gingivo-stomatitis, ulcerative, due to Vincent's bacteria, H. S. Vaughan on, 650
Glands, salivary, so-called "mixed" tumors of, 1288
  P. R. Howe on, 429
Gleason, H. F., "On the Fitting of a Gold Crown or Band" (correspondence), 584
  "Oxyphosphate Cement as a Root-filling" (correspondence), 1339
  "Unhygienic Bridge Work—Malpractice," 730
Gold as a filling material, G. S. Junkerman on, 419
  cohesive and non-cohesive, indications for, and methods of insertion, C. E. Woodbury on, 1209
  cohesiveness and plasticity of, G. S. Junkerman on, 419
  crystal, compared with gold foil, C. E. Woodbury on, 1207
  in casting inlays, C. S. Van Horn on, 893
  manipulation of, G. S. Junkerman on, 421
  physical properties of, W. W. Atkinson on, 434
  preparation of, for insertion in cavity, C. E. Woodbury on, 1207
  refining, 954
  waste, in dental laboratories, 953
Gold and silicate cement, restoring an incisal corner with, 250
Gold crowns, repairing, 127
  to remove and repair, L. Englander on, 131
Gold filling, C. E. Bellchamber on, 441
Gold filling clinic, concerted, 441
Gold fillings, burnished, O. B. Richards on, 362
  by Giovanni Arcoli, J. J. Walsh on, 94
Gold foil, annealing of, C. E. Woodbury on, 1206
  making adhere to an old filling in repairing, 952
  manipulation of, C. E. Woodbury on, 1203
Gold inlay, hollow, method of making, O. J. Fruth on, 443
  something on cavity preparation for, J. V. Conzett on, 1321
Gold inlay retention, contour, O. W. Norton on, 233
Gold inlays, cast, shrinkage in, F. S. Meyer on, 758
  cast, T. P. Hinman on, 203
Gold inlays and fillings, finishing, 952
Gold plate, rolled, effects of annealing on, W. W. Atkinson on, 435
Gold pluggers, common sense, M. Albrecht on, 463
Gold shell crown, hollow, with cast base, for badly decayed posterior teeth, 616
Gold wire, twisted, making a post of, 251
Gold work, repairing, Alexander's wax gold for, 1185
Goslee, H. J., "The Extent to Which the Casting Process May be Advantageously Applied to Crown and Bridge Work," 575
Gostelow, Franklin J., death of, 390
Government, U. S., its efforts toward prevention of diseases, M. C. Smith on, 1230
Graham, W. A., death of, 628
Gramm, S. C., death of, 1384
Great Britain, number of dentists in, 1381
Greek dentistry, J. J. Walsh on, 92
Gregg, G. T., "Excavating Sensitive Dentin by the Aid of Nitrous Oxid and Oxygen" (clinic), 355
  on general anesthesia for daily dental practice, 1145
  on nitrous oxid and oxygen, 934
Grieves, C. J., "Pyorrhea Retentions and Dentures," 269
Grinding down roots of anterior teeth, protecting gingival tissue in, 494
Grinding natural teeth, protecting soft tissues in, 952
Grosby, C. P., "Cavity Preparation for Cast Inlay Abutments for Bridge Work" (clinic), 454
  "Preparation of Root for Porcelain Crowns" (clinic), 454
Guerini, V., "On the Importance of Oral Hygiene in Combating Tuberculosis," 1332
Guilford, S. H., "Orthodontia in Its Relation to Pyorrhea and Oral Hygiene," 1123

Guilford, S. H., on atrophic alveolitis, 1163
  on early treatment of malocclusion, 470
Gum camphor for adapting inlay matrices, 247
Gum irritation and crowns, C. N. Johnson on, 54
Gum recession, treatment of, by autoplasty, 377
Gum sections, how to prevent fractures of, J. L. Elphinstone on, 427
Gum septum, interproximal, injuries to, A. D. Black on, 687
Gums, lancing of, H. B. Tileston on, 199
Gutta-percha, fixation of bridges with, 489
  heating, 381
  its use in combination with validol camphoratum, 241
Gutta-percha fillings, inserting temporary, 382
G. V. Black Dental Club of St. Paul, Minn., announcement, 135
Gwathmey, J. T., on nitrous oxid and oxygen, 931

HABITS producing dental irregularities, 376
Hair protector, an aseptic, for inclosing ladies' hair during dental operations, G. M. Holden on, 463
Hall, A., "Extraction with Reference to Special Points of Instrumentation" (clinic), 449
Hamlet, F. P., "Oral Sepsis," 888
  "Report of the Committee on Practice" (Dental Society of the State of New York), 883
Hands, protecting, when working with photographic developers, 1188
  the operator's, arrangement for sterilization, 1186
  the operator's, protection of, from infection, 1062
  to cleanse from laboratory grime, 131
Harbison, H. R., death of, 958
Hare-lip, treatment of, 1058
Harris, Chapin A., memorial fund, 135
Harris, Frank L., death of, 255
Hartzell, T. B., on mouth infections, 1266
Haslett, H. S., on general anesthetics for daily dental practice, 1145
Hauge, N. A., death of, 627
Hawkes, L. A., "A Case of Dental and Facial Restoration by Porcelain Jacket Crowns," 21
Hayden, G., "Pyorrhea Cases" (clinic), 446
Hayden, W. H., "Casting Bridges, Including Abutments, in a Single Cast" (clinic), 456
Heating, Westinghouse electric, application to dentistry, Dewey D. Smith on, 464
Heaton, J. A., "Removable Band for a Porcelain Crown" (clinic), 452
Hebble, C. H., "Preparation of Cavities for Cast Inlays" (clinic), 442
Hemophilia, hemorrhage in, E. W. Scott on, 60
Hemorrhage after extractions, arresting, 1061
  arresting, by temporary celluloid plates, 379
  stopped by injection of normal serum, E. W. Scott on, 60
Henahan, J. P., "Nitrous Oxid and Oxygen for Extracting" (clinic), 448
Henderson, Hiram F., death of, 835
Hennessy, John C., death of, 835
Heredity in malocclusions, C. S. Case on, 1012
  in syphilis and tuberculosis, C. S. Case on, 1011
  M. H. Cryer on, 331
  M. Dewey on, 342
  C. E. McDowell on, 322
Heredity and variation, laws of, C. S. Case on, 276
Hert, B. S., on beginnings of diseases of peridental membrane and their prevention, 709
Hertig, O. L., on manipulation of gold foil, 1268
Hertz, W. H., on wax patterns, 1047
Hetrick, F. O., response to address of welcome to N. D. A., 1249
Hiatt, N. W., "Removable Bridge" (clinic), 456
Hills, Isaac, death of, 255
Hillyer, E., "President's Address (Dental Society of the State of New York), 912
  "Some Opportunities in Prosthetic Dentistry Afforded by the Casting Process," 879
Hinman, T. P., "Cast Gold Inlays," 203
  on cavity preparation for gold inlays, 1367
Hirschfeld (Tiburtius), Henriette, graduation of, J. S. Cassidy on, 206
Histological preparations of oral tissues, difficulties encountered in making, R. W. Bunting on, 677
Histology, influence of parathyroidectomy upon the incisors of rats, 378
  of the teeth, 487
"Histology and Embryology, Dental, a Text-book of, Including Laboratory Directions," by F. B. Noyes (bibliography), 718
History of dentistry, J. J. Walsh on, 87
"History of Dental Surgery from Primitive Times to the Modern Epoch, Especially in France," by J. L. André-Bonnet, review of, 119
Hoag, Wm. E., announcement of death of, 733
  obituary of, 957
Hoff, N. S., "How Shall the Profession Meet Its New Obligations Resulting from Its Propaganda for Popular Education in Oral Hygiene and Preventive Dentistry?" 778
  "The Curriculum of the College of Dental Surgery of the University of Michigan," 1024
  on beginnings of diseases of peridental membrane and their prevention, 710
  on expansion of dental arch and opening of maxillary suture, 588
  on the necessity for and the training of a prophylactic assistant, 327
Hoffman, A., on expansion of dental arch and opening of maxillary suture, 587
Hoffman, E. C., "Cast Reinforcements for Supporting and Retaining Artificial Dentures" (clinic), 461
Hofheinz, R. H., on beginnings of diseases of the peridental membrane and their prevention, 711
  on oral hygiene and preventive dentistry, 805
  on report of Committee on Practice (Dental Society of the State of New York), 917
Hogan, T. A., on oral sepsis, 1276
Holden, G. M., "An Aseptic Hair Protector for Inclosing Ladies' Hair during Dental Operations" (clinic), 463
Hollister, F. L., obituary notice of, 1144
Hood, J. H., "Mechanical Treatment for Pyorrhea Alveolaris, with the Carr Instruments" (clinic), 445
Hospitals, care of the mouth in, 1056
Hougland, W. S., obituary of, 834
Howard, Elbert J., death of, 835
Howard University, Dental Department, commencement of, 960
Howe, P. R., "Devices and Volumetric Tests for Salivary Analyses," 429
  "The Accelerating and Inhibiting Agents in the Oral Secretions," 567
  "*Treponema Mucosum* of Pyorrhea Alveolaris," 1327
Hulick, W. O., "Crown and Bridge Work," 1357
Hunter's, Dr. W., criticism of American dentistry, M. L. Rhein on, 529
Hurd, W. B., obituary of, 106

Hutchinson, R. G., "Diagnosis and Prognosis of Different Types and Phases of Pyorrhea Alveolaris" (clinic), 224
Hurtt, J. M., death of, 389
Hutchinson, R. G., on pyorrhea and prophylaxis, 97
Hyatt, T. P., on report of Committee on Practice (Dental Society of the State of New York), 926
Hydrofluoric acid, physical injuries as results of, 1287
Hydrogen dioxid, action of, on the flavoring agents of mouth-washes, 1062
  preserving, 247
  unfitness of, for mouth-wash, 1056
  why it fails to work, D. H. Stewart on, 425
Hygiene, justification of orthodontic procedures from the standpoint of, 1057
  mouth: an attempt objectively to measure the relation between community mouth hygiene and the intellectual efficiency and educational progress of elementary school children, J. E. W. Wallin on, 404, 545
  oral, 1063
  oral—a dental clinic for school children in Vienna, 383
  oral, among the Somali tribe, 129
  oral, and preventive dentistry, propaganda for popular education in, N. S. Hoff on, 778
  oral, and pyorrhea, orthodontia in its relation to, S. H. Guilford on, 1123
  oral, dentists' and patients' disregard of, A. C. Fones on, 284
  oral, during typhoid fever, 383
  oral, facts and rules regarding, A. C. Fones on, 285
  oral, in combating tuberculosis, importance of, V. Guerini on, 1332
  oral, in relation to caries, R. W. Bunting on, 541
  oral, in school children, psychological tests, J. E. W. Wallin on, 404
  oral, in the sickroom, 1056
  oral, public dental, in Germany, N. S. Jenkins on, 1228
  oral, public recognition of the necessity of, 250
  oral, recognition of the importance of, B. H. Smith on, 79
  oral, rules by Giovanni Arcoli, J. J. Walsh on, 94
  oral, situation of the movement in Cleveland, Ohio, G. F. Woodbury on, 794
  oral, supreme aims of, C. Röse on, 1214
  oral, untoward effects of sugar and starch on teeth, H. B. Tileston on, 199
  oral, ways and means of advancing the cause of, H. L. Wheeler on, 767
  oral, F. L. Davenport on, 1041
  oral, A. M. Steeves on, 233, 446
Hypercementosis, etiology of, 244
Hyperemia by suction plates, in staphylorrhaphy, H. J. Kauffer on, 234
Hypersensitive cavities, temporary stopping for, 1061
Hypersensitive tooth affected with pericementitis, painless excavation of, by the application of cement, 1187
Hypodermic injections, subperiosteal abscesses due to, M. N. Federspiel on, 1302
Hypodermic needles, preserving free from rust, 1060

Iconoclasm, dental, G. S. Junkerman on, 418
Idaho Board of Examiners, 639, 1298
Illinois Board of Examiners, 639, 1189
Illinois State Dental Society, announcement, 258, 850
Immunity and susceptibility of teeth to caries, R. W. Bunting on, 537
Immunity to dental caries, contribution to the study of, T. von Beust on, 659
Immunization, M. L. Rhein on, 1239
Impacted deciduous molar, extraction of, 1064
Impacted third molars, and consequences, M. N. Federspiel on, 1306
Impaction as a factor in imperfect development, V. E. Barnes on, 3
  etiology of, V. E. Barnes on, 1
  improper orthodontic treatment a cause of, V. E. Barnes on, 4
  periods of, V. E. Barnes on, 2
Implantation of teeth, by Giovanni Arcoli, J. J. Walsh on, 94
Impression compound, separating plaster models from, 494
Impression, for a bridge, aid in taking, 247
  of a root to be crowned, taking, 1378
  sectional, for difficult cases, 128
  use of alum before taking, R. B. Moore on (correspondence), 1247
Impressions, plaster, notes on taking, 723
  wax, in inlay work, how to finish, 730
Impression taking in modeling compound, in sections, H. C. Register on, 359
  prevention of gagging and nausea in, 1063
Impression tray, an elastic banded, C. W. Myers on, 459
  bridge, for taking a bite and impression simultaneously in plaster of Paris, C. H. Woolgar on, 459
Incisal corner, restoring with silicate cement and gold, 250
Incisal edges, porcelain restoration of, W. A. Capon on, 451
Incisors and canines with two roots, 122
Index system for indexing contributions to dental magazines, E. S. Filbert on, 357
Indiana Board of Examiners, 136, 638
Indiana State Dental Association, announcement, 258, 393
Infection, oral defense against, L. C. LeRoy on, 1100
  periapical, surgery of the pulp and its relation to, N. C. Leonard on, 188
Infections of the mouth, etiology and effect on vital organs and other tissues, M. L. Rhein on, 1237
Ingalls, L. S., "Backing a Porcelain Facing with Platinum and Tipping with Gold Without Heating Facing" (clinic), 230
  "Mending Broken Plaster Casts" (clinic), 231
Inlay, cast, manipulating the sprue in wax model, 381
  cast, preparation of cavities for, C. H. Hebble on, 442
  cast gold, for restoration of lingual cusp in bicuspids, 613
  cast gold, Dr. Truman's attack on the, E. M. Agostini on, 776
  cast gold, something on cavity preparation for, J. V. Conzett on, 1321
  cast gold, therapeutic worthlessness of an imperfect, C. S. Van Horn on, 890
  cast gold, W. D. Tracy on, 885
  contour gold, retention of, O. W. Norton on, 233
  gold and porcelain, the burnished matrix, E. Hillyer on, 879
  hollow gold, method of making, O. J. Fruth on, 443
  how to cast, when casting machine is out of order, W. J. Boydston on, 443

Inlay, porcelain, a plea for, 382
  porcelain, Nies' method, D. H. Squires on, 888
  porcelain, perfectly fitting, C. M. Torrance on, 498
  porcelain, C. E. Woodbury on, 451
  pure gold matrix, using Ney's soft foil and sweating 22-karat gold plate, without investment, H. Barnes on, 443
  the perfected porcelain, glass burnishers for, 246
Inlay abutment, cast gold, bridge with, 617
  for bridge work, cavity preparation for cast, C. P. Grosby on, 454
Inlay and other attachments for bridges, W. O. Hulick on, 1362
Inlay bridge, gold, cast in one piece, 726
Inlay crown, W. R. Clack on, 34
Inlay matrices, gum camphor for adapting, 247
Inlay metal, Bohr's, as a basis in root-restoration, W. E. Fribley on, 442
Inlay patterns, removing, 1188
Inlay porcelain, Jenkins', 243
Inlay restoration *vs.* gold fillings, C. S. Van Horn on, 974
Inlays, as bridge attachments, 1291
  cast gold, anchorage of, 728
  cast gold, cleaning, C. S. Van Horn on, 894
  cast gold, for bridge attachments, E. Hillyer on, 880
  cast gold, nodules in, C. S. Van Horn on, 894
  cast gold, oxidizing method of fitting in cavities, F. S. Meyer on, 758
  cast gold, shrinkage in, F. S. Meyer on, 758
  cast gold, sources of failures in making wax pattern in, C. S. Van Horn on, 891
  cast gold *vs.* gold foil fillings, C. E. Woodbury on, 1203
  cast gold, T. P. Hinman on, 203
  cast porcelain, W. D. Tracy on, 885
  cementation of, 1291
  gold, anchorage with diverging removable pivots, 610
  gold, cavity preparation for, J. V. Conzett on, 1324
  gold, finishing, 952
  porcelain, building up, 127
  porcelain, plaster dies for, E. B. Prentiss on, 225
  porcelain, preparing approximal cavities for, 248
Inlay work, how to finish wax impressions in, 730
  method of manipulating wax model in, W. Mullin on, 443
Insanity and dental disease, 954
Institute of Dental Pedagogics, announcement, 134, 630, 1297
Instruments, dental, advantages of tantulum for, 130
  for inserting silicate cement fillings without risk of subsequent discoloration, 381
International Congress on Hygiene and Demography, announcement, 734
Interproximal space and interproximal caries, 611
Investing wax patterns, C. S. Van Horn on, 984
Investment and investing in cast gold inlays, C. S. Van Horn on, 893
Iodin, tincture of, antiseptic treatment of carious vital teeth with, 614
  tincture of, as an antidote in phenol poisoning, 381
Iodin stains, decolorizing, 1185
Iowa Board of Examiners, 639, 1299
Iowa State Dental Society, announcement, 257
Iron, effects of, on the teeth, when administered internally, E. B. Prentiss on, 1002
Iron, effects upon the teeth of the administration of, and precautions, E. B. Prentiss on, 1002
  making rust-proof, 1185
Iron solutions, danger of dilute, for the teeth, E. B. Prentiss on, 1006
  given in capsules to protect the teeth, 380
Irregularities, dental, deformities of nasal respiratory tract coincident with, G. H. Wright on, 261
  dental, produced by habits, 376
  of the teeth, 487
Irwin, A., "Dental Laws Condensed" (bibliography), 945
Ivy, R. H., "Imperfections in the Diagnosis and Treatment of Pathologic Conditions of the Teeth and Jaws," 272

JACKSON, V. H., "Orthodontia" (clinic), 444
  "Orthodontia and Orthopedia of the Face" (clinic), 357
Jacob, E., "Sanitary Matrix Bands of Transparent Celluloid," 499
Jarman, A. W., "Removable Crown and Bridge Work" (clinic), 457
Jarvie Fellowship medal, presentation to Dr. R. R. Andrews, 106
Jaws, human, certain sections of, made by the late Dr. W. D. Miller, R. W. Bunting on, 677
Jenkins, N. S., "Modern Dentistry in Germany," 1225
Johnson, C. N., "Mistakes, Common and Uncommon," 53
Joslin, F. W., death of, 1385
Journals, new, etc., E. S. Filbert (report) on, 1143
Joyner, R. A., and J. W. McBain, "Amalgams Containing Tin, Silver, and Mercury," 641
Joynes, D. J., death of, 1384
Junkerman, G. S., "Dental Iconoclasm," 418

KANSAS City Dental College, commencement of, 839
Kansas State Dental Association, announcement, 135
Kauffer, H. J., "Method of Promoting More Favorable Prognostications for Staphylorrhaphy by the Use of Hyperemia Induced by Suction Plates" (clinic), 448
  "The Use of Hyperemia Induced by Suction Plates to Promote More Favorable Prognostications for Staphylorrhaphy" (clinic), 234
  on filling root-canals with an improved paraffin compound, 1159
Kebler, L. F., "Preparations for the Toilet of the Mouth and Teeth," 1328
Kells, C. E., "Stereoscopic Dental Skiagraphs (Stereographs)," 745
  "Unsanitary Regulating Appliances" (correspondence), 789
Kelly, J. L., "Removable Bridges" (clinic), 457
  on oral hygiene and preventive dentistry, 808
Kelly, Nathan A., death of, 1384
Kelsey, J. H., "Oral Prophylaxis Treatment" (clinic), 446
Kelsey, W. F., springs suggested for "A Difficult Case for Prosthetic Restoration," 833
Kendrick, M. A., "The Use of Dental Splints in Pyorrhea Cases" (clinic), 445
Kentucky State Dental Association, announcement, 394
Kenyon, W. S., death of, 1385
Kessler, Chas., death of, 835

Ketcham, A. H., "Treatment by the Orthodontist Supplementing That by the Rhinologist," 1312
King, Chas. E., death of, 732
King, T. J., death of, 958
Kirk, E. C., "The American Text-book of Operative Dentistry," review of, 116
  on effects upon the teeth of the administration of iron, 1039
  on filling root-canals with an improved paraffin compound, 1156
  on mouth-infections, 1262
Kissing, an epidemic of chancres of the lip from, 123
Klock, E. A., death of, 627
Koonz, P. J., death of, 389
Koser, A. S., on manipulation of gold foil, 1270
Kost, Walter H., death of, 390

LACTIC acid in treating pyorrhea alveolaris, caution in use of, 381
Lake Erie (Pa.) Dental Association, announcement, 393
Lakin, A. W., death of, 958
Lamp, alcohol, *vs.* Bunsen burner, 953
Lancing of the gums, H. B. Tileston on, 199
Lane, J. G., on orthodontia in its relation to pyorrhea and oral hygiene, 1168
  on wax patterns, 1044
Lansing, A. G., "Obtunding Sensitive Erosions Permanently" (clinic), 224
Latimer, C. M. N., death of, 1385
Laubach, C. C., "Treatment of Putrescent Pulps, Using Aromatic Sulfuric Acid and Sodium Bicarbonate" (clinic), 361
Laval University Dental School, commencement of, 1071
Laws, dental, condensed, compilation by A. Irwin (bibliography), 945
Lebanon Valley (Pa.) Dental Association, announcement, 632
Leeuwenhoek's microscopical studies, J. J. Walsh on, 95
Legislation creating a corps of naval dental surgeons, 1285
Legislation *re* the "dental nurse," 1280
Leonard, N. C., "Surgery of the Pulp and Its Relation to Periapical Infection," 188
  on cast gold inlays, 220
LeRoy, L. C., "Atrophic Alveolitis," 1095
  on orthodontia in its relation to pyorrhea and oral hygiene, 1166
  on pyorrhea and prophylaxis, 102
Leslie, Friend C., death of, 835
Leucoplakia buccalis, with report of three cases, 827
  treatment of, 1187
"Leucoplakia in the Mouth," by A. Maggioni Winderling, review of, 373
Ligatures, by-effects of, 614
  in orthodontia, 1179
  rubber dam, and clamps, and infection, 949
Lincoln Dental College, commencement of, 838
Lip, chancres of, an epidemic from kissing, 123
Lip-sucking producing malocclusion, 376
Little, J. F., "Anatomy: A Manual for Students and Practitioners," review of, 374
Literature, professional, the dentist's attitude toward, A. S. Van Teslaar on, 193
Lockjaw, elimination of, 1383
Lodge, E. B., "The Amputation of the Apical Root-end as Treatment in Chronic Alveolar Abscess; Aided by Skiagraphs Made at Same Sitting" (clinic), 450
Loeffler, E. F., "A Practical Demonstration of the Use of the Ether Spray from Desensitizing Hypersensitive Dentin" (clinic), 448
Longenecker, D. R., death of, 1384
Loose upper and lower incisors, temporary retention for, 615
Lorand, A., "Old Age Deferred," review of, 374
Louisville College of Dentistry, commencement, 841
Low, F. W., on effects upon the teeth of the administration of iron, 1040
  on oral hygiene and preventive dentistry, 812
  on root-canal treatment, 72
Lowe, John R., death of, 733
Luckie, S. B., "Method of Using the Tooth-brush to Get the Best Prophylactic Effect" (clinic), 355
Ludwig's angina, points regarding, 382
Lundy, W. E., on cavity preparation for gold inlays, 1371

McAFEE, S. H., "High-fusing Metals in the Initial Steps of Crown and Bridge Work" (clinic), 455
McBain, J. W., and R. A. Joyner, "Amalgams Containing Tin, Silver, and Mercury," 641
McCall, J. O., "Oral Prophylaxis and Pyorrhea" (clinic), 445
  on beginnings of diseases of the peridental membrane, and their prevention, 711
  on oral hygiene and preventive dentistry, 810
McCauley, C. M., "Amalgams: Their Manufacture, Manipulation, and Physical Properties. Cements: Their Manipulation and Physical Properties," 174
McClure, J. H., "Regulating Appliances" (clinic), 444
MacConaghy, James G., death of, 628
McCullough, P. B., his views on extension for prevention, J. Truman on, 413
  indorsement of his views on extension for prevention, J. P. Erwin on, 401
  review of his paper entitled "Wherein Clinical Evidence is At Variance with Extension for Prevention," by W. R. Clack, 25
McCurdy, S. LeR., "Oral Surgery: A Text-book on General Surgery and Medicine as Applied to Dentistry" (bibliography), 823
MacDonald, C. F., "Potassium Sulfocyanate *vs.* Diacetic Acid," 58
MacDougall, S. E., on oral hygiene and preventive dentistry, 810
McDowell, E. C., on nasal deformities and dental irregularities, 321
McGehee, W. H. O., "An Experimental Study of the Tooth-staining Properties of Various Colored Dentifrices," 289
  "Stock Vaccines in the Treatment of Pyorrhea Alveolaris," 997
McKean, A. L., death of, 732
McLean, W. T., death of, 1384
McManus, J., on nitrous oxid and oxygen, 936
Magee, J. M., on early treatment of malocclusion, 472
  on oral sepsis, 601
Magnesia, milk of, administration of, injuries from, H. B. Tileston on, 198
Magnesium and calcium in bones and teeth in health and disease, proportions of, 831
Maine Board of Examiners, 742
Maine Dental Society, announcement, 635
Mallet covered with rubber dam, M. Albrecht on, 463
Mallets, mechanical and hand, comparative filling tests with, 441
  selection of, C. E. Woodbury on, 1212

Malocclusion, advantages of early treatment, R. Ottolengui on, 467
  effects of, on mastication, A. H. Suggett on, 655
  extraction unnecessary for correction of, J. L. Young on, 231
  heredity in, C. S. Case on, 1012
  in relation to pyorrhea alveolaris, W. F. Spies on, 987
  prevention of, 375
  produced by habits, 376
  producing defective speech, 124
  supra-occlusion of molars in open-bite, 497
  M. N. Federspiel on, 1306
Mandible, double resection of, H. P. Pickerill on, 1114
Marlow, G. C., "New Method of Taking a Bite" (clinic), 458
Marsh, John S., death of, 390
Marshall, J. P., "Manipulation of Gold in Dentistry and Jewelry" (clinic), 442
Martindale, E. W., "Cast Anchor Plate: Bauman Method" (clinic), 459
Maryland Board of Examiners, 507, 1298
Maryland State Dental Association, announcement, 737
Mason, B. T., "Soldering Without a Blowpipe" (clinic), 229
Massachusetts Board of Registration, 395, 742, 1078
Massachusetts Dental Society, announcement, 503
Massage in polishing teeth, C. N. Johnson on, 54
Masterson, J. E., death of, 835
Mastication, effects of malocclusion on, A. H. Suggett on, 655
  influence of, on condition of teeth, 952
  in relation to dental caries, R. W. Bunting on, 542
Matrices, ring, for plastic fillings, 493
  inlay, gum camphor for adapting, 247
Matrix, an auxiliary, 249
  for making wax patterns for cast gold inlays, C. S. Van Horn on, 978
  the electrotyped, for porcelain work; porcelain *vs.* gold, 729
Matrix bands of transparent celluloid, sanitary, E. Jacob on, 499
Matrix clamp and celluloid band, G. H. Shannon on, 229
Maxillary bone, superior, case of restoration of, G. W. Cupit on, 36
Maxillary bones, pathological phases concerning the, 1301
Maxillary changes, influence of, on the eye, G. H. Wright on, 266
Maxillary sutures, a study of, G. H. Wright on, 261
  the question of opening, A. H. Ketcham on, 1317
M.D. degree for dentists, B. H. Smith on, 83
Mead, B. E., death of, 1384
Measles, necrosis of jaw after, 1291
Medical men, errors of, due to lack of dental knowledge, R. H. Ivy on, 273
Medicine *versus* dentistry, E. H. Baker on, 694
Medico-Chirurgical College, Department of Dentistry, commencement of, 963
Meharry Dental College, commencement of, 836
Meisburger, L., on oral hygiene and preventive dentistry, 813
  on pyorrhea and prophylaxis, 104
Melendy, A. R., "President's Address" (N. D. A.), 1251
Melotte's metal, quick method of remounting teeth on vulcanite or Weston metal plates with, 832
Menges, M. A., death of, 835
Mercurial stomatitis, treatment with salvarsan, 615
Mercury, effects of, upon the maxillæ, 721
Merrick, Wm. C., death of, 835
Merritt, A. H., "Cavity Varnish for the Prevention of Thermal Shock" (clinic), 228
  "Dental Clinics of the Children's Aid Society" (correspondence), 1338
Merritt, Wm. H., death of, 1384
Metal, fusible, in articulation, 358
"Metallurgy: a Text-book for Workers in the Metal Industries," by A. Fenchel (bibliography), 943
Metchnikoff lactic ferment food recommended in pyorrhea alveolaris, A. Zentler on, 788
Metzler, M. B., death of, 255
Meyer, F. S., "Shrinkage in Cast Gold Inlays," 758
Michaels, Joseph P., obituary of, 622
Michigan Board of Examiners, 507, 1299
Michigan University, College of Dental Surgery, curriculum of, N. S. Hoff on, 1024
Micro-organisms in caries, R. W. Bunting on, 539
Microscopical studies, Leeuwenhoek's, J. J. Walsh on, 95
Middaugh, H. C., on wax patterns, 1046
Middle ages, dentistry in, J. J. Walsh on, 93
Milam, T. M., on prophylactic treatment, 74
Milk of magnesia, administration of, injurious, H. B. Tileston on, 198
Miller, W. C., on the care of the mouths and teeth of little children, 216
Miller, W. D., certain sections of human jaws made by, R. W. Bunting on, 677
Milliken, Geo. G., death of, 252
  obituary of, 387, 1144
Minneapolis Dental Society, announcement, 1298, 1386
Minnesota State Dental Association, announcement, 394
Mirrors, cleaning, 494
Mississippi Board of Examiners, 743
Mississippi Dental Association, announcement, 505
Mitchell, W. H., "A Flexible Lower Denture" (clinic), 234
Modeling compound, taking impressions with, in sections, H. C. Register on, 359
Models, plaster, separating from a compound impression, 494
Moffitt, J. J., "Some Uses of Radiography in Dentistry," 867
  on oral sepsis, 1276
Molar, impacted deciduous, extraction of, 1064
  lower first, case of a three-rooted, 248
Mold-making, N. S. Essig on, 423
Montana Board of Examiners, 850, 1078
Montana State Dental Society, announcement, 971
Moriarity, James W., death of, 627
Morris, R., on crown and bridge work, 1364
Moseley, W. H., "An Ideal Bicuspid Crown Made by Using a Porcelain Veneering Over a Gold Shell Crown" (clinic), 452
Mouth, the best index of health or disease, E. H. Baker on, 698
Mouth-breathers (orthodontia patients are mostly), A. H. Ketcham on, 1312
Mouth-breathing, persisting after removal of adenoids, A. H. Ketcham on, 1313
  "sprinting" as a cure for, G. E. Smith on, 132
Mouth-breathing and pulmonary tuberculosis, relations between, 384
Mouth conditions, diseases due to, E. H. Baker on, 699
Mouth-wash after extractions, 1061
  formula for a, 1063

Mouth-washes, action of hydrogen dioxid on the flavoring agents of, 1062
  experiments with, W. H. O. McGehee on, 304
  hydrogen dioxid in, D. H. Stewart on, 425
  C. N. Johnson on, 57
  L. F. Kebler on, 1328
Mullin, W., "Method of Manipulating the Wax Model in Inlay Work" (clinic), 443
Mummies, no gold fillings in, J. J. Walsh on, 89
Mummifying agents, C. N. Johnson on, 56
Murphy, J. D., death of, 133
Mutilation and extraction of teeth among natives of Central Africa, 611
Myers, C. W., "An Elastic Banded Impression Tray" (clinic), 459

NASAL deformities, correction by arch expansion, H. A. Pullen on, 520
Nasal obstructions, effects of, A. H. Suggett on, 658
Nasal respiratory tract, deformities of, and instruments for comparative measurements demonstrating changes in nasal fossæ when readjusting the maxillary arch, G. H. Wright on, 261
National Association of Dental Examiners, announcement, 1072
National Association of Dental Faculties, announcement, 843
  vs. Dental Faculties Association of American Universities, B. H. Smith on, 81
National Dental Association, fifteenth annual meeting, Section I, proceedings of, 63, 331
  Section II, proceedings of, 70
  Section III, proceedings of, 207, 319
National Dental Association, sixteenth annual meeting, announcement, 391, 844
  committee on publicity, notice from, 630
  election of officers, 1341
  general sessions, proceedings of, 1247, 1340
  Section I, proceedings of, 1357
  report of Revision Committee: Constitution and By-laws, 1344
  report of the Committee on Scientific Research, 1352
National Dental Association, Southern Branch, announcement, 965
  proceedings of, 216
National Dental Association, The Washington Meeting of the (editorial), 1171
National Dental Protective Association, announcement, 502
National Dental Relief Fund, A. R. Melendy on, 1252
National Guard, dental surgeons for, E. Hillyer on, 916
Nausea, treatment for, 1063
Navy dental legislation, Dr. Wm. Donnally's efforts concerning, J. Truman on, 1342
Navy dental surgeons, legislation creating a corps of, 1285
Nebraska State Dental Society, announcement, 632
Necrosis, mandibular, operation for, 130
  of jaw, after measles, 1291
Necrosis and relative probability of its occurrence in either jaw, M. N. Federspiel on, 1302
Negligence, dentists', M. L. Rhein on, 530
Nephritis, chronic interstitial, uremia, and failure of cardiac compensation due to oral sepsis, J. Daland on, 1223
Nervous and dental diseases, relationship of, 1377
Neuralgia, facial, relief of, 130
  diagnosis of pulp-stones causing, 873
Neuralgia, trifacial, alcohol injection of the Gasserian ganglion, 491
  trifacial, technique and results of deep injections of alcohol for, 488
  trifacial, treatment of, 1375
  trifacial, X-ray diagnosis in cases of, J. J. Moffitt on, 874
New Dental Institute at Berlin (editorial), 1284
New Hampshire Board of Registration, 1299
New Hampshire State Dental Society, announcement, 394
New Jersey Board of Registration, 395, 1299
New Jersey State Dental Society, announcement, 258, 849
Newton, Frank H., death of, 627
New York College of Dentistry, commencement of, 960
New York Institute of Dental Technique, announcement, 971
Ney's soft foil in making pure gold matrix inlay, H. Barnes on, 443
Nickel, pure, instruments of, inserting silicate cement fillings, 381
Nitrous oxid and air, self-administered, the office anesthetic for small surgery, 492
Nitrous oxid and its sequences, anesthesia with special reference to, 243
Nitrous oxid and oxygen, a word to the beginner, C. K. Teter on, 903
  analgesia with, C. K. Teter on, 905
  as a general anesthetic, and its use in dentistry, C. K. Teter on, 895
  excavating sensitive dentin by the aid of, G. T. Gregg on, 355
  fundamental principles involved in the administration of, C. K. Teter on, 900
  physiological action of, C. K. Teter on, 895
  prolonged anesthesia produced by, A. E. Smith on, 447
Nitrous oxid and oxygen anesthesia, 1063
  observation in 2000 cases, 1180
  suggestions for safe, 1187
Nitrous oxid, effect of, on the brain, C. K. Teter on, 896
Nodine, A. M., on mouth infections, 1266
North, G., "Table Talk on Temperaments" (clinic), 462
North Carolina Board of Examiners, 508
North Carolina State Dental Society, announcement, 506
North Dakota Board of Examiners, 1387
North Dakota State Dental Association, announcement, 393
Northeastern Dental Association, announcement, 1078
Northern Illinois Dental Society, announcement, 1190
Northern Ohio Dental Association, announcement, 740
North Pacific College, Dental Department, commencement of, 839
Norton, J. H., "Contour Gold Inlay Retention" (clinic), 233
Northwestern University, Dental Department, commencement of, 1069
Nose, instrument for recording internal width between antral walls, G. H. Wright on, 263
Novocain anesthesia by the mucous and conductive methods, G. Fischer on (bibliography), 1175
Novocain injection, contributions to the avoidance of failures in the modern method of anesthesia, 375
Novocain-suprarenin for local anesthesia in extractions, 496
Nova Scotia Dental Association, announcement, 637

- Noyes, F. B., "A Text-book of Dental Histology and Embryology, Including Laboratory Directions," review of, 718
  - on amalgams, 213
- Nurse, The Dental (editorial), 715
- Nurse, dental, necessity for, and training of a, A. C. Fones on, 284
  - trained dental, and the arguments for and against the, N. S. Hoff on, 780
  - F. P. Hamlet on, 890
  - E. Hillyer on, 915
  - C. C. Voelker on, 919
- Nutrition, hygiene of, reforms imperative in, C. Röse on, 1217

- Occlusion, influence of forces of, on development of bones of skull, 170, 633
  - modern appreciation of, W. D. Tracy on, 883
- Odontological Society of Western Pennsylvania, announcement, 392
- Odontomes, follicular, and complications, M. N. Federspiel on, 1307
- Offices, dental, inspection of, F. L. Davenport on, 1043
- Ohio College of Dental Surgery, commencement of, 842
- Ohio State Dental Society, announcement, 971, 1190, 1298
- Oklahoma Oral Hygiene Society, organization of, announcement, 632
- Oklahoma State Dental Association, announcement, 392
- "Old Age Deferred," by A. Lorand, review of, 374
- Omission, the art of, 383
- Ontario Dental Association and Canadian Dental Society, union meeting, 133
- Operative dentistry, is it degenerating? J. Truman on, 413
  - not degenerating; an answer to Dr. Truman, E. M. Agostini on, 775
- Orthodontia, advantages of early treatment of malocclusion, R. Ottolengui on, 467
  - arch-calculation as an indicator for proper amount of expansion in, V. E. Barnes on, 9
  - "bone-growing" in, C. S. Case on, 281, 1014
  - "bone-growing" and the "working retainer," E. H. Angle on, 856
  - by-effect of ligatures; rotation of ligated teeth, 614
  - canine as the criterion tooth in, 495
  - cases of class II, division I, A. H. Suggett on, 657
  - causes governing in, C. S. Case on, 137
  - celluloid plates in, 379
  - deformities of the nasal respiratory tract, coincident with dental irregularities, and new instrument for comparative measurements of changes in nasal fossæ, G. H. Wright on, 261
  - distal movements in, C. S. Case on, 1010
  - evolution of, recent developments, E. H. Angle on, 853
  - examination and calculation of normal arch development in, V. E. Barnes on, 6
  - expansion arch, an improved form of, E. H. Angle on, 856
  - expansion arch from its early to its present form, E. H. Angle on, 853
  - expansion of dental arch and opening maxillary suture, H. A. Pullen on, 509
  - experiments on rabbits, A. H. Suggett on, 657
  - extraction in, C. S. Case on, 137
  - extraction in, M. H. Cryer on, 331
  - extraction in, M. Dewey on, 341
  - extraction in, H. C. Ferris on, 347
- Orthodontia, extraction unnecessary in, J. L. Young on, 231
  - facial anchorage device, 14
  - habits producing dental irregularities, 376
  - improvement of Angle's expansion arch, 609
  - in its relation to pyorrhea and oral hygiene, S. H. Guilford on, 1123
  - ligatures in, 1179
  - moving canines, bicuspids, and molars on one side, buccally, 616
  - normal arch development, V. E. Barnes on, 4
  - prevention of dental deformities, 375
  - question of extraction in, C. S. Case on, 276
  - regulating appliances, J. H. McClure on, 444
  - regulating interlocking upper centrals or laterals, 129
  - rules for extraction, applied to Angle classification, C. S. Case on, 139
  - securing separation for the adjustment of clamp bands in, 615
  - soldering stand, H. A. Pullen on, 228
  - supra-occlusion of molars in open-bite malocclusion, 497
  - suture-opening in, 12
  - symmetroscope: an apparatus for measuring the symmetry of dental arches, 490
  - the question of extraction in, answer to Dr. Dewey's discussion, by C. S. Case, 1008
  - the question of opening the maxillary suture, A. H. Ketcham on, 1317
  - the .030-inch diameter arch and its application, E. H. Angle on, 857
  - typal variations and predispositions, H. A. Pullen on, 512
  - unsanitary regulating appliances, C. E. Kells on, 789
  - use of vertical tubes in arch expansion, 947
  - V. H. Jackson on, 444
  - widening the mandibular as well as the maxillary arch, A. H. Ketcham on, 1319
- Orthodontia and orthopedia of the face, V. H. Jackson on, 357
- Orthodontia appliances employed for moving teeth, modifications of, H. A. Pullen on, 522
- Orthodontia cases of classes II and III, retention plate of rubber in, 727
- Orthodontia expansion arch, H. A. Pullen on, 358
- Orthodontia models, M. F. Finley on, 444
- Orthodontia operations from the standpoint of hygiene, justification of, 1057
- Orthodontia treatment, benefit and aims of, H. A. Pullen on, 510
  - development of bones of face and jaws by, A. H. Suggett on, 655
  - early indicated, H. A. Pullen on, 517
  - gaining space for the adjustment of clamp bands in, 248
  - injudicious, effects of, V. E. Barnes on, 10
  - improper, a cause of impaction, V. E. Barnes on, 4
- Orthodontist, treatment by, supplementing that by the rhinologist, A. H. Ketcham on, 1312
- Osburn, R. C., "On Supernumerary Teeth in Man and Other Mammals," 1193
- Osteomyelitis of jaw, acute, 1289
  - M. N. Federspiel on, 1304
- Ottofy, L., "Dental Clinics in Manila," 1245
- Ottolengui, R., "The Advantages of Early Treatment of Malocclusion," 467
  - on oral sepsis, 596
  - on report of Committee on Practice (Dental Society of the State of New York), 927
- Oxydase in saliva, 128
- Oxyphosphate cement as a root-filling, H. F. Gleason on, 1339

PALATAL defects, effect of, on speech, 125
Palmer, L. E., "Various Crowns, with Reference to Esthetic and Resistive Principles" (clinic), 227
Pamphlets received, 483
"Panmixia," the most important cause of dental deterioration, C. Röse on, 1214
Paraffin compound, an improved, filling root-canals with, H. Prinz on, 1081
  therapeutics of the, H. Prinz on, 1081
Paraffin injection for disfigurement following dental abscess, 494
Paraffin treatment of chalky enamel, 1384
Parathyroidectomy, influence of, upon the incisors of rats, 378
Parker, G. B., "Method of Filling Root-canals" (clinic), 232
Patent legislation, open letter from the N. D. A. committee on (correspondence), 706
Patents relating to dentistry, monthly record of, 136, 260, 396, 508, 640, 744, 852, 972, 1080, 1192, 1300, 1388
  resolution on, E. A. Bryant on, 1260
Pathological conditions of teeth and jaws, imperfections in diagnosis and treatment of, 724
Pathological training, errors of dentists due to lack of, R. H. Ivy on, 274
Pathology, divergence of the medical and dental professions in regard to the teaching of, R. H. Ivy on, 272
Patten, C. C., on oral sepsis, 599
Patterson, Leon C., "For Finishing Wax Impressions in Inlay Work," 730
Payson, W. S., "An Anchorage" (clinic), 235
Pennsylvania Board of Examiners, 638, 1300
Pennsylvania State Dental Society, announcement, 394, 1190
  proceedings of, 179, 355, 1135, 1268
Perforated teeth, contribution to the treatment of, 489
Pericemental diseases, beginnings of, A. D. Black on, 684
Pericementitis, celluloid plates in, 379
  painless excavation of hypersensitive tooth affected with, by application of cement, 1187
  phagedenic, during pregnancy, effect on oral development in the progeny, A. Zentler on, 1121
Periodontal disease, 486
Perkins, J. A., and R. L. Jones, "Autogenous Vaccine Treatment of a Case of Advanced Pyorrhea Alveolaris," 774
Perry, Safford G., death of, 252, 499, 957
Perspiring hands, alum for, 1060
Peters, C. E., on general anesthetics in daily dental practice, 1146
Phagocytosis, M. L. Rhein on, 1239
Pharmacology, early efforts in, J. J. Walsh on, 87
Phenol poisoning, tincture of iodin as an antidote in, 381
Phenol-sulfonic acid, therapeutic action of, H. Prinz on, 397
Pherrin, J. B., on extension for prevention, 76
Philadelphia Dental College (Temple University), commencement of, 964
Phillips, Thos. C., death of, 733
Phœnicians, dentistry among the, J. J. Walsh on, 90
Phosphates, in oral fermentation, tables showing importance of, P. R. Howe on, 573
  in saliva, volumetric analysis for determining, P. R. Howe on, 432
  in saliva, with alkaline reaction, P. R. Howe on, 571
Photographic developers, protecting the hands when working with, 1188
Physicians' indifference to oral sepsis, M. L. Rhein on, 530
Pickerill, H. P., "Double Resection of the Mandible," 1114
  "Stomatology in General Practice" (bibliography), 1175
  "The Prevention of Dental Caries and Oral Sepsis" (bibliography), 479
Piedmont (S. C.) District Dental Society, announcement, 135
Pierson, Hugh, death of, 255
Pin-setter, double-end, M. Albrecht on, 464
Pin teeth, removable, 1381
Pivot tooth, removable, 496
Plant, A. O., "Combination of Diatoric Tooth and Metal Casting for Restoration of Posterior Teeth" (clinic), 453
Plaques, dental, influence of potassium sulfocyanate on, L. H. Wirt on, 318
  T. B. von Beust on, 316
Plaster of Paris, hard, in vulcanite plate work, importance of, 127
  removing from a vulcanite denture, 1381
  retarding the setting of, 247
Plaster casts, mending broken, L. S. Ingalls on, 230
Plaster impressions, notes on taking, 723
Plaster models, separating, without separating fluids, 952
Plate, a flexible lower, W. H. Mitchell on, 234
  cast anchor, Bauman method, E. W. Martindale on, 459
  gum sections, strengthener in, J. L. Elphinstone on, 428
  ill-fitting, sarcoma due to an, 248
  segmental gold, assembling and investing, W. W. Atkinson on, 437
  segmental gold, dies and counter-dies for, W. W. Atkinson on, 437
  segmental gold, soldering, W. W. Atkinson on, 439
  softening rubber before packing a, 247
  vulcanite, closing the flask in making a, 831
  vulcanite, of black rubber with pink rubber veneer, made in one vulcanization, 496
  vulcanite, re-attaching one or more teeth to, 494
Plate or bridge, choice of, 830
Plate trimmers, using old burs as, 247
Plates, aluminum, caution in the use of, 727
  buccal flanges as an aid in retaining, J. L. Elphinstone on, 875
  cast aluminum, 123
  cast gold, E. Hillyer on, 882
  cast metal, making wax model for, W. S. Rose on, 229
  one-piece gold, disadvantages of the old method of swaging, W. W. Atkinson on, 434
  partial, making clasps for, G. E. Bishop on, 459
  soldered, sweating teeth of, 1062
  technique of various steps in the construction of, S. C. G. Watkins on, 460
  temporary celluloid, 379
  vulcanite, method of substantially repairing lower, C. C. Birdsall on, 226
  vulcanite, obtaining smooth palatal surfaces in, 952
  vulcanite, producing smooth surfaces in, 1061
  vulcanite, repairing, 495
Plate work, a method of anatomical articulation in, 1066
  hints for setting up teeth in, 953

Plate work, how to prevent fracture of gum sections, J. L. Elphinstone on, 427
  quick method of remounting teeth on vulcanite or Weston metal plates, with Melotte metal, 832
  packing rubber, 1381
  removing plaster from a vulcanite denture, 1381
  vulcanite, importance of hard plaster of Paris in, 127
Platinum solder formula, 1382
Plugger points and mallets, selection of, C. E. Woodbury on, 1212
Pluggers, gold, M. Albrecht on, 463
Plumlee, Dave, death of, 835
Plumper for restoring facial expression, bridge with, E. P. Wright on, 764
Polish, a quick, 247
Polishing fillings with sandpaper disks, 494
Polishing teeth; tape, wooden points, and massage in, C. N. Johnson on, 54
Polyarthritis, septic, fatal case of, oral in origin, J. Daland on, 1223
Porcelain, casting, C. S. Van Horn on, 980
  casting, F. S. Welden on, 233
  vs. gold, the electrotyped matrix for porcelain work, 729
  with special consideration of Jenkins' inlay porcelain, 243
  F. J. Capon on, 451
Porcelain, all-, occlusal surfaces in bridge work, caution in the use of, 955
Porcelain cast inlays, W. D. Tracy on, 885
Porcelain crown, platinum frame, porcelain face, W. A. Capon on, 362
  removable band for, J. A. Heaton on, 452
Porcelain crowns or inlays, building up, 127
Porcelain-faced crown, cast, F. S. Ford on, 232
  A. W. Twigger on, 226
Porcelain facing, backing with platinum and tipping with gold without heating the facing, L. S. Ingalls on, 230
  new method of securely fastening to gold base or cap of crown and bridges without soldering, 377
Porcelain filling, an accurately adapted, 385
Porcelain inlay, a perfectly fitting, C. M. Torrance on, 498
  a plea for, 382
  the perfected, glass burnishers, 246
  C. E. Woodbury on, 451
Porcelain inlays, plaster dies for, E. B. Prentiss on, 225
  preparing approximal cavities for, 248
Porcelain jacket crowns, a case of dental and facial restoration by, L. A. Hawkes on, 21
  preparation, manipulation, and baking of, W. A. Coston on, 452
  H. J. Frank on, 452
Porcelain restoration of incisal edges, W. A. Capon on, 451
Porcelain technique, E. R. Sausser on, 356
Porcelain teeth, criticism on, Norman S. Essig on, 424
Porcelain veneering over a gold shell crown, an ideal bicuspid crown made by using, W. H. Moseley on, 452
Porter, Jesse, death of, 1384
Postgraduate courses, dental, in Germany, N. S. Jenkins on, 1228
Post of gold wire, how to make a, 251
Posts or tubes, roughening before cementing in root-canals, 495
Potassium cyanid as a flux in soldering, 247
Potassium permanganate, black discoloration of the teeth due to, 1055
Potassium sulfocyanate in saliva, R. W. Bunting on, 543
  its influence on dental plaques, L. H. Wirt on, 318
  vs. diacetic acid, C. F. MacDonald on, 58
Pregnancy, care of women's teeth during, 830
  diet during, H. B. Tileston on, 198
  oral development in the progeny influenced by the buccal tissues during, A. Zentler on, 1119
  prophylaxis during, F. H. Skinner on, 45
Prentiss, E. B., "Effects Upon the Teeth of the Administration of Iron, Acids, etc., and the Precautions Taken by Physicians to Avoid Injury to the Enamel," 1002
  "Plaster Dies for Porcelain Inlays" (clinic), 225
Preparatory Standards (editorial), 476
Preston, A. E., "Lining Deep-seated Cavities in Teeth with Vital Pulps" (clinic), 227
  "Separation by Sea-tangle Tent" (clinic), 227
Price, W. A., on pyorrhea and prophylaxis, 102
Pringle, G. W., "Some of the Practical Uses of the Case Abrasive Disk" (clinic), 232
Prinz, H., "Filling Root-canals with an Improved Paraffin Compound," 1081
  "On the Therapeutic Action of Phenol-sulfonic Acid," 397
Prize competition of the Zentralverband der Oesterreichischen Stomatologen, 848
Profession, dental, adolescence of the, J. P. Corley on, 220
Professionalism (editorial), 1373
Progress, professional, B. H. Smith on, 79
Prophylactic assistant, the necessity for and training of a, A. C. Fones on, 284
Prophylactic treatment, in the application of arsenic, 1290
  oral, J. H. Kelsey on, 446
Prophylaxis, oral, in history, L. F. Kebler on, 1329
  oral, method of using tooth-brush in, S. B. Luckie on, 355
  oral, specializing in, by dental practitioners, N. S. Hoff on, 784
  oral, W. D. Tracy on, 885
Prophylaxis, oral, and pyorrhea alveolaris, L. D. Coriell on, 359
  J. O. McCall on, 357, 445
  F. H. Skinner on, 39
Prosthesis—case of restoration of the superior maxillary bone, G. W. Cupit on, 361
Prosthetic cases, difficult, springs in, 833, 1292
Prosthetic dentistry, 487
  buccal flanges as a factor in retaining dentures, J. L. Elphinstone on, 875
  of today, and its possibilities, 422
  some possibilities in, afforded by the casting process, E. Hillyer on, 879
Prosthetic restoration, a difficult case for, 386
  springs suggested for difficult case for, 833, 1292
Protrusion, inferior, etiology of, H. P. Pickerill on, 1114
"Provincialism" (editorial), 236
Ptyalin in saliva, R. W. Bunting on, 543
Public school dental clinic in Vienna, 383
Pullen, H. A., "Orthodontia Expansion Arch," 358
  "Expansion of the Dental Arch and Opening the Maxillary Suture, in Relation to the Development of the Internal and External Face," 509
  "Orthodontia Soldering Stand" (clinic), 228
Pulmonary infarct, septic, case of, J. Daland on, 1223

Pulp, capping of, 1286
  dead, method of disinfecting a tooth with, 128
  devitalization of, and root-canal treatment, 1181
  devitalization of, with salvarsan, 726
  diagnosis of diseases of, by electric current, 1186
  extirpation of, and local anesthesia, attitude of the profession toward, N. C. Leonard on, 188
  on the distribution of the nerves of the, 1055
  secondary calcifications of, R. W. Bunting on, 157
  surgery of, and its relation to periapical infection, N. C. Leonard on, 188
Pulp anesthetic, Norwegian, 948
Pulp-canals, putrescent, treatment with sodium and potassium, J. Tichy on, 447
Pulp-devitalization, use of arsenous oxid in deciduous teeth, H. B. Tileston on, 202
  with arsenic, prophylactic treatment in, 1290
  with salvarsan, 1288
Pulp exposure, sterilization of cavity and, N. C. Leonard on, 189
Pulp extirpation of, surgical stages of, N. C. Leonard on, 189
Pulpitis, acute, allaying pain in, 496
Pulp removal, surgical, in children's permanent and deciduous teeth, N. C. Leonard on, 192
Pulps, putrescent, treatment of, using aromatic sulfuric acid and sodium bicarbonate, C. C. Laubach on, 361
  refractory, and partially devitalized, N. C. Leonard on, 190
  vital, capping, 382
Pulp-stone causing neuralgia, X-ray diagnosis of, J. J. Moffitt on, 873
Pulp-stones, R. W. Bunting on, 168
Pus, effects of ingested, M. L. Rhein on, 1240
  in the mouth, due to impaired nutrition, M. L. Rhein on, 1242
Pyemia, case of pyorrhea combined with, J. Daland on, 1222
Pyorrhea alveolaris, 486
  advanced, autogenous vaccine treatment of a case of, J. A. Perkins and R. L. Jones on, 774
  beginnings of, A. D. Black on, 684
  caution in the use of lactic acid in treating, 381
  combined with septicemia and pyemia, case of, J. Daland on, 1222
  condiments in, L. C. LeRoy on, 1098
  constitutional results of, M. M. Bettman on, 1110
  diagnosis and prognosis of different types and phases of, R. G. Hutchinson on, 224
  dry, F. H. Skinner on, 41
  favorable prospects of a cure, M. M. Bettman on, 1113
  in connection with Vincent's bacteria, H. S. Vaughan on, 650
  initial causes of, F. H. Skinner on, 39
  instruction of patients, F. H. Skinner on, 44
  instrumentation, L. C. LeRoy on, 1103
  instrumentation and systemic treatment of, A. Zentler on, 702
  its cause and treatment, W. F. Spies on, 987
  its importance in constitutional disorders and its treatment by vaccine, 487
  mechanical treatment with Carr instruments, J. H. Hood on, 445
  medicinal treatment in, W. F. Spies on, 996
  nomenclature, A. Zentler on, 702
  palliative medication, L. C. LeRoy on, 1102
  pockets in, L. C. LeRoy on, 1100
Pyorrhea alveolaris, proposed regimen in, A. Zentler on, 788
  question of cure, L. C. LeRoy on, 1101
  radiography in, J. J. Moffitt on, 869
  scaling teeth, disclosing solution for, F. H. Skinner on, 43
  stock vaccines in the treatment of, W. H. O. McGehee on, 997
  theory of acquired immunity in the treatment of, 723
  tooth-powder in, F. H. Skinner on, 44
  treatment of, by Carr method, 224
  treatment of; cases cured, C. P. Wood on, 445
  treatment of with specially designed instruments, G. F. Eames on, 225
  treatment of, F. H. Skinner on, 42, 224
  treponema mucosum of, P. R. Howe on, 1327
  using Good's selection of Younger's instruments in, W. J. Charters on, 445
  vaccine treatment of, 384
  varied clinical picture in, M. L. Rhein on, 1242
  various systemic diseases due to, M. M. Bettman on, 1111
  F. L. Davenport on, 1042
  F. P. Hamlet on, 889
  L. C. LeRoy on, 1095
Pyorrhea and oral hygiene, orthodontia in its relation to, S. H. Guilford on, 1123
Pyorrhea and oral prophylaxis, J. O. McCall on, 357, 445
  F. H. Skinner on, 39
Pyorrhea cases, use of dental splints in, M. A. Kendrick on, 445
Pyorrhea delusions, M. N. Federspiel on, 1312
Pyorrhea retentions and dentures, C. J. Grieves on, 269
Pyorrhea splints, F. R. Getz on, 458
  cast, E. Hillyer on, 882

Quimby, A. J., "Clinical Demonstration of Taking and Developing X-ray Pictures of the Teeth, etc." (clinic), 231

Radiograph, interpreting a, J. J. Moffitt on, 868
Radiographs, cases of neglect as revealed by, M. L. Rhein on, 530
Radiography, a warning in interpreting, A. H. Ketcham on, 1318
  dental, office outfit for, J. J. Moffitt on, 867
  dental, preparing the patient, J. J. Moffitt on, 868
  dental, some uses of, 497, 867
  dental, taking and developing X-ray pictures, A. J. Quimby on, 231
  dental, time of exposure and use of intensifying screen in, 131
  dental, D. H. Squires on, 887
  dental, W. D. Tracy on, 884
  round envelopes for films, 1382
Ranula and its treatment, 826
Read, T. G., "Preservation of Good Health and Sound Teeth by Eating No Other Bread Than That Composed of Flour when the Ferments or Enzymes of Wheat have Performed Their Action," 1107
Recession of gums, autoplasty for, 377
Reciprocity and state dental boards, F. L. Davenport on, 1043
  Montana Board of Examiners cancels its reciprocity contracts, 1078
Records of conditions of peridental membrane, A. D. Black on, 693
  of operation, keeping, D. H. Squires on, 886
Refining gold, 954

Register, H. C., "The Taking of Impressions in Modeling Compound in Sections" (clinic), 359
Regulating appliance, J. H. McClure on a, 444
Regulating appliances, unsanitary, C. E. Kells on, 789
Regulating inlocking upper centrals or laterals, 129
Reichmann, Max, "A Case of Fracture of the Lower Jaw Diagnosed Only by Means of the X Ray," 618
Reid, J. G., "Some Casting Specialties in Crown and Bridge Work" (clinic), 453
Replantation and its success, 1380
Replantation and transplantation, 488
Research, dental, government subsidy urged for, A. R. Melendy on, 1254
Resection of mandible, double, H. P. Pickerill on, 1114
  of root-apex, contributions to the problem of, 720
  of root-apex, for removal of foreign bodies from root-canals, 1289
Respiration, effects of normal and faulty, H. A. Pullen on, 509
Retention, temporary, for loose upper and lower incisors, 615
Retention plate of rubber in orthodontia cases of classes II and III, 727
Rhein, M. L., "Mouth Infections: Their Etiology, and a Consideration of What Effect They May Have on the Vital Organs and Other Tissues," 1237
  "Oral Sepsis," 529
  on filling root-canals with an improved paraffin compound, 1153
  on oral hygiene and preventive dentistry, 799
  on pyorrhea and prophylaxis, 103
  on "Report of Committee on Practice" (Dental Society of the State of New York), 928
  on the necessity for and training of a prophylactic assistant, 326
Rhinologist, treatment by, supplementing that by the orthodontist, A. H. Ketcham on, 1312
Rhode Island Board of Registration, 638, 1298
Richards, O. B., "Burnished Gold Fillings" (clinic), 362
Robinson, James E., death of, 835
Roe, Ermina P., death of, 255
Roentgenography, plastic, 721
Romans, dentistry among the, J. J. Walsh on, 91
Root, fractured, restoring, J. M. Crosby on, 444
Root-amputation, radiography as an aid in, J. J. Moffitt on, 872
Root-apex, resection of, contribution to the problem of, 720
Root and crown, fractured, restoration of, 955
Root-canal filling, forcing beyond the apex, C. N. Johnson on, 56
  immediate, N. C. Leonard on, 191
  phagocytosis in, F. W. Low on, 72
  reaming, C. N. Johnson on, 56
  C. N. Johnson on, 55
Root-canal treatment, 828
  and devitalization, 1181
  aseptic, M. L. Rhein on, 533
  practical method of using smooth broaches in, 830
  present status in relation to the minute anatomy of root-canals in man, especially at its apical foramen, 722
  R. Ottolengui on, 597
Root-canals, calcific deposits in, R. W. Bunting on, 169
  enlargement with sodium dioxid, 126
  filling with an improved paraffin compound, H. Prinz on, 1081
Root-canals, history of filling, H. Prinz on, 1081
  method of filling, G. B. Parker on, 232
  minute anatomy of, especially at the apical foramen, 722
  perforation of, C. N. Johnson on, 56
  present condition of treatment of, 1186
  resection of root-apex for removal of foreign bodies from, 1289
  scientific treatment of, correction of Dr. M. L. Rhein's formula, 239
Root-end, amputation of apical as treatment in chronic alveolar abscess, E. B. Lodge on, 450
Root-filling, oxyphosphate cement as a, H. F. Gleason on, 1339
Root-perforation, care of, J. J. Moffitt on, 870
Root restoration, using Bohr inlay metal as a basis, W. E. Fribley on, 442
Roots, absorption of, disclosed by the radiograph, J. J. Moffitt on, 872
  artificial, implantation of, 488
  of anterior teeth, protecting gingival tissue in grinding down, 494
  splint, 497
Rose, Angus V., obituary of, 627
Röse, C., "The Fundamental Causes of Dental Deterioration, and the Supreme Aims of Dental Hygiene," 1214
Rose, W. S., "Some Hints on Metal Work" (clinic), 229
Rosenthal, D. A., "A Device for Facilitating the Perfect Adaptation of Backings and Soldering with the Least Possible Chance of Checking Facings" (clinic), 456
Ross. J. A., death of, 835
Rotation of ligated teeth, contribution to, 614
Royal College of Dental Surgeons of Ontario, commencement of, 836
Rubber, pink, bleaching, 1060
  softening, before packing a plate, 247
  synthetic, 1383
  vulcanite, "aging" of, its cause and prevention, 826
Rubber dam, application of, C. E. Woodbury on, 1205
  hint regarding the use of, 730
  ligatures, and clamps, and infection, 949
"Rubber Hand-stamps and the Manipulation of India Rubber," by T. O'C. Sloan (bibliography), 945
Rubber plates, packing, 1381
Rust-proof, making iron, 1185
Rutland (Vt.) County Dental Society (announcement), 394
Rybstat, Wladyslaw L., death of, 133

Sager, A. E., on expansion of the dental arch and opening the maxillary suture, 585
Saliva, alexins in, R. W. Bunting on, 544
  detection of carbonates, etc., in, P. H. Howe on, 432
  detection of sulfates in, P. R. Howe on, 432
  in relation to dental caries, R. W. Bunting on, 540
  method of determining specific gravity of, P. R. Howe on, 431
  oxydase in, 128
  potassium sulfocyanate in, R. W. Bunting on, 543
  protective action of, P. R. Howe on, 567
  ptyalin in, R. W. Bunting on, 543
  quantitative analysis of carbon dioxid, H. C. Smith on, 1353
  variations in the occurrence of nitrite in, 382
  viscidity of, in relation to caries, P. R. Howe on, 570

Saliva, volumetric determination of chlorids in, P. R. Howe on, 432
  volumetric test for calcium in, P. R. Howe on, 433
  with alkaline reaction, phosphates in, P. R. Howe on, 571
Saliva-collecting devices, P. R. Howe on, 430
Salivary analyses, devices and volumetric tests for, P. R. Howe on, 429
  potassium sulfocyanate *vs.* diacetic acid in, C. F. McDonald on, 58
Salivary analysis, diagnosis and treatment based on, H. C. Ferris on, 1355
  report of Scientific Committee (N. D. A.) on, 1353
Salivas from different glands, variation in, P. R. Howe on, 429
Salvarsan, in diseases of the oral cavity due to spirochetes, local treatment with, 1288
  local treatment in spirochetic diseases of oral cavity, 726
  pulp devitalization with, 726, 1288
  ("606"), treatment of mercurial stomatitis with, 615
Salvarsan reaction on teeth, 1186
Sandusky, Granville C., death of, 732
Sarcoma due to an ill-fitting denture, 248
Sausser, E. R., "Porcelain Technique" (clinic), 356
Saws, mechanical, waxing, 1290
Sawyer, A. J., on oral sepsis, 599
Scalers, making useful, 382
Scaling teeth, disclosing solution for, F. H. Skinner on, 43
Scarsdale, H. B., death of, 1384
Schamberg, M. I., on mouth infections, 1260
Schillinger, E. A., "Partial Lower Denture with Gold Crowns and Clasps" (clinic), 227
School children, elementary: an attempt objectively to measure the relation between community mouth hygiene and the intellectual efficiency and educational progress of, J. E. W. Wallin on, 404, 545
School dental clinics, public, in Sweden, 615
Schools, dental, plea for independent, B. H. Smith on, 82
Schreier's paste in root-canal treatment, discussion on, 598
Scott, E. W., "Hemorrhage in Hemophilia," 60
Sea-tangle tent, separation by, A. E. Preston on, 227
Sebastian, J. B., "Phenakit Cement" (clinic), 463
Secretions, oral, accelerating and inhibiting agents in, P. R. Howe on, 567
Sedlacek, A., "Chemical and Technical Formulæ and Hints for Dental Practice," review of, 120
Self-cleansing factors in the oral cavity and dental caries, 832
Semans, H. M., on secondary calcifications of the tooth-pulp, 211
Separating fluid, 1381
Separating fluids, separating plaster models without, 952
Separation, securing, for the adjustment of clamp bands in orthodontia, 615
Sepsis, oral, diseases undoubtedly due to, J. Daland on, 1221
  oral, due to faulty dental operations, W. O. Hulick on, 1359
  oral, from the physician's standpoint, J. Daland on, 1221
  oral, influence on digestive disorders, 610
  oral, the physician's indifference to, M. L. Rhein on, 530
  oral, F. P. Hamlet on, 888
Septic dental operations, M. L. Rhein on, 1244
Septicemia, case of pyorrhea combined with, J. Daland on, 1222
Serum, normal, two cases of severe hemorrhage stopped by injection of, E. W. Scott on, 60
Serum treatment of pyorrhea alveolaris, 723
Setting-up teeth in plate work, hints for, 953
Seventh and Eighth District Dental Societies of the State of New York, announcement, 1297
  proceedings of, 585, 707
Shannon, G. H., "Celluloid Band and Matrix Clamp" (clinic), 229
Sharp, J. G., "President's Address" (Dental Faculties Association of American Universities), 1017
Sharpening instruments, water best for Arkansas stone in, 1381
Shellac solution, making a clear, 495
Shock in dental operations, W. H. DeFord on, 1128
Silicate cement, hardened, removing from a roughened glass slab, 1185
Silicate cement and gold, restoring an incisal corner with, 250
Silicate cement fillings, instruments for inserting, without risk of subsequent discoloration, 386
  practical hints for, 724
Silicate cements, W. D. Tracy on, 885
Silver nitrate, removing discoloration of teeth caused by, 381
Silver solvent, sulfuric acid as, 383
Sinus, maxillary, combination bridge and drainage tube for, T. E. Turner on, 449
Sinusitis, maxillary, chronic purulent, irrigation through the inferior meatus in preference to the alveolus, 1062
Skiagraphs for amputation of apical root-end as treatment in chronic alveolar abscess, E. B. Lodge on, 450
  plastic, 721
  stereoscopic dental (stereographs), C. E. Kells on, 745
Skinner, F. H., "Pyorrhea and Prophylaxis," 39
  "Pyorrhea" (clinic), 224
Skull, influence of forces of occlusion on development of bones of, 170, 663
  influence of the teeth upon the development of, 948
Sleppy, R. M., death of, 1385
Sloan, T. O'C., "Rubber Hand-stamps and the Manipulation of India-rubber" (bibliography), 945
Smith, Augustus B., obituary of, 254
Smith, A. E., "Prolonged Anesthesia Produced by Nitrous Oxid and Oxygen" (clinic), 447
Smith, B. H., "Professional Progress," 79
Smith, C. E., "Excavating Sensitive Cavities, Using Nitrous Oxid and Oxygen" (clinic), 448
Smith, Dewey D., "The Application of the Westinghouse Electric Heating in Dentistry" (clinic), 464
Smith, H. T., on the tooth-staining properties of various colored dentifrices, 330
Smith, M. C., "What the Government is Doing to Prevent Diseases," 1230
Smith, W. W., on mouth hygiene, 790
  on oral hygiene and preventive dentistry, 813
  on pyorrhea and prophylaxis, 100
Sodium and potassium in root-canal treatment, 598
  treatment of putrescent root-canals with, J. Tichy on, 447
Sodium dioxid, enlargement of root-canals with, 126

Solder, method of adding, in a soldered bridge, 381
  platinum, formula for, 1382
Soldering floors and cusps to banded crowns, 381
Soldering, potassium cyanid as a flux in, 247
Soldering segmental gold plate, W. W. Atkinson on, 439
Soldering stand for orthodontia, H. A. Pullen on, 228
Soldering without a blowpipe, B. T. Mason on, 229
Soldering with the least chance of checking facings, D. A. Rosenthal on, 357
Somali tribe, oral hygiene among, 129
South Carolina Board of Examiners, 639
South Carolina State Dental Association, announcement, 739
South Dakota Board of Examiners, 136, 743
South Dakota State Dental Society, announcement, 135
Southeastern Dental University, commencement of, 836
Southern California Dental Association, announcement, 505
Southern Dental College, commencement of, 837
Southern Minnesota Dental Society, announcement, 502
Southwestern Nebraska Dental Society, announcement, 392
Southern Wisconsin Dental Association, announcement, 635
Speech defects in anomalies of the teeth and palate, 124
Sperber, Chas. A., death of, 835
Spies, W. F., "Pyorrhea, Its Cause and Treatment," 987
Spirochetes, local treatment with salvarsan in diseases of the oral cavity due to, 1288
Spirochetic diseases of oral cavity, local treatment with salvarsan, 726
Spittoons, keeping clean, 1060
Splint, interdental, for fracture of the mandible, 946
  Kingsley, for maintaining apposition after double resection of mandible, H. P. Pickerill on, 1116
Splints, cast pyorrheal, E. Hillyer on, 882
  dental, use of, in pyorrhea cases, M. A. Kendrick on, 445
  for pyorrheal cases, 269, 996
  interdental, for pyorrhea, F. R. Getz on, 458
Spray, compressed air, for the sickroom, 1056
Springs suggested for "A Difficult Case of Prosthetic Restoration," 833, 1292
Spurrier, Jennie F., death of, 732
Squires, D. H., "Scientific Development," 886
  on beginnings of diseases of the peridental membrane, and their prevention, 707
Staining properties of various colored dentifrices, experimental study of, W. H. O. McGehee on, 289
Stains, amount of penetration and action of sunlight and water on, W. H. O. McGehee on, 310
  from food, W. H. O. McGehee on, 313
  iodin, decolorizing, 1185
  metallic and non-metallic, W. H. O. McGehee on 289
  from food, W. H. O. McGehee on, 313
  tobacco, W. H. O. McGehee on, 312
Stallman, G. E., "Caution in the Use of All-porcelain Occlusal Surfaces in Bridge Work," 955
Standards, Preparatory (editorial), 476
Stanley, N. A., on early treatment of malocclusion, 473
Stanley, N. A., on the casting process in crown and bridge work, 592
Staphylorrhaphy by use of hyperemia, induced by suction plates, H. J. Kauffer on, 234, 448
Starch and sugar, untoward effects of, on teeth, H. B. Tileston on, 199
Starkweather, C. S., "A Simple and Reliable Casting Outfit" (clinic), 442
Starling-Ohio Medical College Dental Department, commencement of, 840
Starr, A. R., on filling root-canals with an improved paraffin compound, 1152
State University of Iowa, College of Dentistry, commencement of, 963
Stauffer, S. M., on oral sepsis, 1278
Steam pressure developed in the vulcanizer, casting under, 251
Steele, John R., death of, 500
Steeves, A. M., "Oral Hygiene" (clinic), 233, 446
Stereographs, stereoscopic dental skiagraphs, C. E. Kells on, 745
Sterilization, lack of, 1054
  of cavity and pulp exposure, N. C. Leonard on, 189
  of cotton-holder, syphilitic infection transmitted owing to lack of, 727
  of operator's bands, arrangement for, 1186
  of rubber dam, ligatures, and clamps, 949
  of tooth-brush, 125
Sterilizing burs, preserving sharpness in, 128
Sterilizing wax, 247
Stevens, Geo. W., death of, 627
Stevens, James S., death of, 389
Stewart, D. H., "Why Hydrogen Dioxid Fails to Work," 425
Sticky-wax, how to make, 1060
Stillman, P. R., on pyorrhea and prophylaxis, 101
Stockberger, W. W., on the efforts of the U. S. government toward prevention of diseases, 1258
Stockwell, Chester T., obituary of, 253
Stomatitis, mercurial, treatment with salvarsan ("606"), 615
  nicotiana, 1053
  ulcerous, in children, 950
"Stomatology in General Practice," by H. P. Pickerill (bibliography), 1175
Stone age, observations on the teeth and jaws found in an ossuary of the, 1057
Stoppers, cork, rendering impermeable, 248
Stopping, temporary, a useful, 1060
Strang, R. H. W., on dental impaction and preservative treatment, 66
  on early treatment of malocclusion, 468
  on extension for prevention, 77
Subirana, L., address before the National Dental Association, 1256
Sugar, increasing consumption of, a cause of growing dental degeneration, C. Röse on, 1218
Sugar and starch, untoward effects of, on teeth, H. B. Tileston on, 199
Suggestion, mental, in dental operations, W. H. DeFord on, 1130
Suggett, A. H., "Development of the Bones of the Face and Jaws by Orthodontic Treatment," 655
Sulfates in saliva, detection of, P. R. Howe on, 432
Sulfuric acid, action on bone and tooth structure, as compared with that of phenol-sulfonic acid, H. Prinz on, 400
  as a silver solvent, 383
Supernumerary teeth in man and other mammals, R. C. Osburn on, 1193

Surgery, Oral: a Text-book on General Surgery and Medicine as Applied to Dentistry, by S. LeR. McCurdy (bibliography), 823
Susceptibility and immunity to bacterial infection, M. L. Rhein on, 1238
Susquehanna Dental Association of Pennsylvania, announcement, 504
  proceedings of, 1041, 1161
Suture, maxillary, advantages of opening the, H. A. Pullen on, 526
  maxillary, methods of opening the, H. A. Pullen on, 509, 527
Sutures of facial bones, membranous character of, H. A. Pullen on, 519
Sweating teeth off soldered plates, 1062
Sweden, public school dental clinics in, 615
Symmetroscope, an apparatus for measuring the symmetry or asymmetry of dental arches, 490
Syncope, Japanese treatment of, 1061
Syphilitic diseases of oral cavity, local treatment with salvarsan, 726
Syphilitic infection transmitted by non-sterilized cotton-holder, 727
Syphilitic origin of oral disease, M. N. Federspiel on, 1308
Syphilis and tuberculosis, heredity in, C. S. Case on, 1011

TAGGART-BOYNTON suit, the, F. L. Davenport on, 1042
Tantalum, advantages of dental instruments made of, 130
Teeth, all-porcelain, advantages over facings in crown and bridge work, H. J. Goslee on, 577
  artificial, not a luxury, 382
  artificial, removing from old vulcanite plates, 1061
  artificial, sweating off of, from soldered plates, 1062
  at birth, cases of the presence of, 121
  crown and bridge, methods of attachment of, H. J. Goslee on, 578
Teeth and bones in health and disease, proportions of calcium and magnesium in, 831
Temperaments, table talk on, G. North on, 462
Tennessee State Dental Association, announcement, 506
Teratomata, teeth enveloped in, 1379
Teter, C. K., "Nitrous Oxid and Oxygen as a General Anesthetic, and Its Use in Dentistry," 895
  and J. H. Lenker, "Prolonged Anesthesia with Nitrous Oxid and Oxygen Administered Through the Nose for the Removal of Tonsils and Adenoids" (clinic), 448
Texas Board of Examiners, 395
Texas State Dental Association, announcement, 393, 838
Thermal shock, cavity varnish for prevention of, A. H. Merritt on, 228
Thompson, James F., death of, 835
Tic douloureux, alcohol injection of the Gasserian ganglion for, 491
  deep injections of alcohol for, 488
Tichy, J., "Treatment of Putrescent Pulp-canals with Sodium and Potassium" (clinic), 447
Tignor, E. P., address before the National Dental Association, 1259
Tileston, H. B., "Care of the Mouths and Teeth of Little Children," 197
  on amalgams, 214
  on crown and bridge work, 1363
  on surgery of the pulp, and periapical infection, 218
Tindall, W., "Welcome from the District of Columbia Board of Commissioners" (N. D. A.), 1248
Tobacco as a complicating factor in anesthesia, 946
  stomatitis produced by, 1053
Tobacco and alcohol, removing the odor of, from the mouth, 1060
Tobacco stains, W. H. O. McGehee on, 312
Tokyo Dental College, J. G. Sharp on, 1019
Tongue, protection of patient's, during dental operations, 1061
  ulcerous lesions of, 1186
Tonsils faucial, and the teeth, 129
  faucial, indications for removal of, 1183
Toothache due to a plug of earwax, 951
Tooth-brush, a fountain, W. O. Campbell on, 445
  method of using to get the best prophylactic effect, S. B. Luckie on, 355
  sterilization of, 125
Tooth-brushes, bacteriology of, 129
Tooth-brushes and tooth-pastes, bacteria of the mouth and, 128
Tooth development, earliest stages of, R. R. Andrews on, 47
  in the unborn child, care of, H. B. Tileston on, 197
Tooth-germ, accidental splitting of, dental abnormalities as explained by, R. C. Osburn on, 1200
Tooth-pastes and tooth-brushes and bacteria of the mouth, 128
Tooth-powder, formula for a, 1063
  in pyorrhea alveolaris, F. H. Skinner on, 44
Torrance, C. M., "A Hint Regarding the Use of the Rubber Dam," 730
  "A Perfectly Fitting Porcelain Inlay," 498
Tousey, S., "X-ray Diagnosis in Dentistry" (clinic), 232
Tracy, W. D., "Operative Dentistry," 883
  on effects upon the teeth of the administration of iron, 1037
Training (The) of Dental Instructors (editorial), 1050
Transplantation and replantation, 488
Travis, J. J., "Gold Bridge, Using Davis Crown for Anterior and Posterior Positions" (clinic), 453
Treponema mucosum of pyorrhea alveolaris, P. R. Howe on, 1327
Tri-Society (N. J.) Exhibit and Convention, announcement, 505
Trismus of the jaws, case of, M. N. Federspiel on, 1365
Tropacocain, 1289
Truman, J., "Is Operative Dentistry Degenerating?" 413
  "Is the Dental Profession Prepared to Abandon the 'D.D.S.'?" 672
  an answer to; operative dentistry *not* degenerating, E. M. Agostini on, 775
  "Report of Committee on President's Address" (N. D. A.), 1341
Tube-and-post attachment, new, for removable bridge work, H. J. Goslee on, 583
Tuberculosis of maxillæ, sources of invasion in, 495
  on the importance of oral hygiene in combating, V. Guerini on, 1332
  pulmonary, and mouth-breathing, relations between, 384
Tuberculosis and syphilis, heredity in, C. S. Case on, 1011
Tufts College Dental School, commencement of, 1070

Tumors of salivary glands, so-called "mixed," 1288
Turner, T. E., "A Combination Bridge and Drainage Tube for the Maxillary Sinus" (clinic), 449
Tuttle, Benjamin N., death of, 835
Twigger, A. W., "Porcelain-faced Crowns" (clinic), 226
Typhoid fever, oral hygiene during, 383

ULCERATIONS of the mouths of sick persons, treatment of, 1056
Ulcerous lesions of the tongue, 1186
University College of Medicine, Dental Department, commencement of, 839
University of Buffalo, Department of Dentistry, commencement of, 841
University of California, Dental Department, commencement of, 838
University of Michigan, Dental Department, commencement of, 1069
University of Minnesota, College of Dentistry, commencement of, 1070
University of Pennsylvania, School of Dentistry, commencement of, 962
University of Pittsburgh, School of Dentistry, commencement of, 964
University of Southern California, Dental Department, commencement of, 961
University of Tennessee, College of Dentistry. commencement of, 838
Utah State Dental Society, announcement, 635

VACCINE treatment, autogenous, of a case of advanced pyorrhea alveolaris, J. A. Perkins and R. L. Jones on, 774
  of pyorrhea alveolaris, 384, 487
Vaccines, stock, in the treatment of pyorrhea alveolaris, W. H. O. McGehee on, 997
Vacuum cleaner, helpful hints for the use of, I. W. Copeland on, 465
Validol camphoratum, gutta-percha and its use in combination with, 241
Vanderbilt University Department of Dentistry, commencement of, 842
Van Dusen, Andrew P., death of, 835
Van Horn, C. S., "Casting Failures and Remedies," 890
  "The Wax Pattern: a Technique, Together with Appliances, etc., for Its Execution," 973
Van Sant, F. W., death of, 732
Van Teslaar, A. S., "The Dentist's Attitude Toward Professional Literature," 193
Vaughan, H. S., "Ulcerative Gingivo-stomatitis Due to Vincent's Bacteria," 650
Vermont Board of Examiners, 640
Vermont State Dental Society, announcement, 392, 850
Villars, J. J., death of, 1384
Vincent, Frank A., death of, 255
Vincent's bacteria, ulcerative gingivo-stomatitis due to, H. S. Vaughan on, 650
Virginia Board of Examiners, 639
Virginia State Dental Association, announcement, 637
Viscosimeter, the, P. R. Howe on, 431
Volatile substances, glass-stoppered bottles for, 615, 952
Volck, Adelbert J., obituary of, 730
Volland, R. H., on cavity preparation for gold inlays, 1368
V-shaped spaces, filing of, between teeth as a prophylactic measure, W. R. Clack on, 38
Vulcanite denture, flasking, 1186
  removing plaster from, 1381
  replacing a tooth in, 1291
Vulcanite dentures, 1185
  packing, 1381
Vulcanite plate, method of substantially repairing lower, C. C. Birdsall on, 226
  of black rubber with pink rubber veneer, made in one vulcanization, 496
  old, removing teeth from, 1061
  producing smooth surfaces in, 1061
Vulcanite rubber, "aging" of, its causes and prevention, 826
Vulcanite trimmers, using old burs as, 247
Vulcanizing flasks, keeping clean, 1060
Vulcanization, a method of anatomical articulation of teeth after, 1066

WALKER, L. J., "Advantages of Ambidextrous Operating" (clinic), 464
Walker, W. W., complimentary dinner to, 133
Wallin, J. E. W., "Experimental Oral Euthenics: An Attempt to Measure the Relation Between Community Mouth Hygiene and the Intellectual Efficiency and Educational Progress of Elementary School Children," 404, 545
Walsh, J. J., "How Old the New in Dentistry!" 87
Ward, M. L., on secondary calcifications of the tooth-pulp, 207
Washington Meeting, The, of the National Dental Association (editorial), 1171
Washington University Dental School, Alumni Association, announcement, 503
  commencement of, 964
Watkins, S. C. G., "Technique of Various Steps in the Construction of Artificial Dentures" (clinic), 460
  on amalgams, 214
  on root-canal filling, 73
Waugamann, Zachariah T., death of, 390
Waugh, L. M., on calcification, 110
  on effects upon teeth of the administration of iron, 1036
  on expansion of dental arch and opening of maxillary suture, 589
  on oral hygiene and preventive dentistry, 810
Wax for cast gold inlays, testing expansion and contraction of, F. S. Meyer on, 763
  sterilizing, 247
  sticky-, how to make, 1060
Wax carvers for making wax patterns for cast gold inlays, C. S. Van Horn on, 983
Wax impressions, finishing, in inlay work, 730
Wax, liquid, process for casting gold inlays, C. S. Van Horn on, 976
Wax model for cast inlay, manipulating the sprue in, 381
  in inlay work, method of manipulating, W. Mullin on, 443
Wax pattern: a technique, together with appliances for its execution, C. S. Van Horn on, 973
  for cast gold inlay, matrix for, C. S. Van Horn on, 978
  investing, C. S. Van Horn on, 984
Wax patterns for cast gold inlays, sources of failure in, C. S. Van Horn on, 891
Wax-softener, for making wax patterns for cast gold inlays, C. S. Van Horn on, 981
W. D. Miller Club of Pittsburgh, Pa., announcement, 258
Webb, J. F., death of, 1384
Weeks, S. M., on dental impaction and preventive treatment, 65

Weeks, T. E., "Some Dowel and Hollow Metal Crowns, Showing Correct Principles in Construction" (clinic), 358
  on oral sepsis, 598
Weights, lifting of, by the teeth, how sometimes accomplished, 1061
Welden, F. S., "Casting Porcelain" (clinic), 233
Welty, James, death of, 499
West Branch (Pa.) Dental Fraternity, announcement, 741
Western Dental College, commencement of, 961
Western Reserve University Dental School, commencement of, 962
West Virginia Board of Examiners, 507
West Virginia State Dental Society, announcement, 740
Wheeler, H. L., "Ways and Means of Advancing the Cause of Mouth Hygiene in Such a Way as to Benefit the Public and the Profession," 767
  on oral hygiene and preventive dentistry, 804
  on secondary calcifications of the tooth pulp, 210
Whipple, L. E., "A Manual of Mental Science" (bibliography), 240
White, W. A., on mouth hygiene, 797
Whitney, Auville L., obituary of, 834
Whitslar, W. H., "Chirognomy Exhibit" (clinic), 462
Williams, D. B., on dental history, 95
Williams, N. A., death of, 958
Williamson, W. H., obituary of, 732
Willis, F. M., "Fusible Metal in Articulation" (clinic), 358
  on atrophic alveolitis, 1163
Wilson, G. H., "A Manual of Dental Prosthetics" (bibliography), 239
Winderling, A. Maggioni, "Leucoplakia in the Mouth," review of, 373
Wirt, L. H., "Influence of KCNS on the Dental Plaque" (correspondence), 318
Wisconsin Board of Examiners, 507, 1299
Wisconsin State Dental Society, announcement, 849
Wolfe, Emanuel M., death of, 835
Women dentists, the pioneer, J. S. Cassidy on, 206
Wood, C. P., "Treatment of Pyorrhea: Exhibiting Cases Cured" (clinic), 445
Wood, J. P., death of, 133
Woodbury, C. E., "Manipulation of Gold Foil," 1203
  "Porcelain Inlay" (clinic), 451
  on amalgams, 215
Woodbury, G. F., on mouth hygiene, 794
Woolgar, C. H., "Bridge Impression Tray for Taking a Bite and Impression Simultaneously in Plaster of Paris" (clinic), 459
Worthley, F. G., death of, 390
Wright, Cyrus M., death of, 256
  on the necessity for and training of a prophylactic assistant, 325
Wright, E. P., "A Bridge with Plumper for Restoring Facial Expression," 764
Wright, G. H., "(I) A Group of Deformities of the Nasal Respiratory Tract, Coincident with Dental Irregularities. (II) New Instrument for Comparative Measurements, Demonstrating Changes in Nasal Fossæ when Readjusting the Maxillary Arch," 261
  on secondary calcifications of the tooth-pulp, 211
Wyoming Board of Examiners, 743

Xi Psi Phi Dental Fraternity, announcement, 1072
X ray, fracture of lower jaw diagnosed by means of the, 618
  some uses of, in dentistry, J. J. Moffitt on, 867
X-ray diagnosis in dentistry, S. Tousey on, 232
X-ray films, dental, round envelopes for, 1382
X-ray pictures, plastic, 721
  A. J. Quimby on, 231

Yogurth diet in pyorrhea alveolaris, A. Zentler on, 788
Young, D. H., "The Treatment of Dental Abscesses by Atmospheric Pressure" (clinic), 447
Young, J. K., "Handbook of Anatomy," review of, 373
Young, J. Lowe, "Models Made Before and After Treatment to Prove that Extraction for the Correction of Malocclusion is Unnecessary" (clinic), 231
Young, John L., death of, 255

Zentler, A., "Instrumentation, the Prime Factor in Treatment of Conditions Causing Disturbances of the Alveolo-dental Ligament; Systemic Treatment Most Essential in Advanced Cases," 702
  "Oral Development in the Progeny Influenced by the Buccal Tissues During Pregnancy," 1119
  "Proposed Regimen in Alevolo-dental Arthritis" (correspondence), 788
Zentralverband der Oesterreichischen Stomatologen, prize offered by, 1079
